

# STATE OF INDIANA STANDARD HAZARD MITIGATION PLAN



APRIL 25, 2005



## **ACKNOWLEDGEMENTS**

*This Plan was developed by the  
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**Federal Emergency Management**

## **Promulgation of the State of Indiana Standard Hazard Mitigation Plan**

The primary role of the government is to provide for the welfare of its citizens. The welfare of Indiana Citizens is never more threatened than during disasters. In the management of emergencies the goal is to provide for mitigation, preparedness, response and recovery actions that ensure public welfare is restored and preserved. The State of Indiana Standard Hazard Mitigation Plan is an integral element of the emergency management effort.

The State of Indiana Standard Hazard Mitigation Plan provides a comprehensive framework for statewide disaster mitigation. It identifies the risks and vulnerabilities of the state to multiple hazards and establishes goals and strategies to address those risks and vulnerabilities.

All departments of the state government cooperate with the Indiana Department of Homeland Security in the planning process that provides an effective framework for the implementation of the identified strategies. State departments have demonstrated repeatedly that they can work together to achieve the common goal of disaster mitigation in a effort to reduce the risks and vulnerabilities Indiana faces to natural disasters.

The State of Indiana Standard Hazard Mitigation Plan ensures consistency with current policy guidance and describes the interrelationship with other levels of government. The plan will continue to evolve, reflecting lessons learned from actual experiences in disasters and ongoing state planning. The plan will be continually reviewed, maintained and updated to reflect the changes in Federal and State statutes and mitigation opportunities within the State of Indiana. I am confident that it will serve as a basis for improving coordination and strengthening relationships among all of our partners on the state, federal, local and private levels.

Therefore, in recognition of the emergency management responsibilities of state government with the authority vested in me as the Governor of the State of Indiana, I do hereby promulgate the State of Indiana Standard Hazard Mitigation Plan.

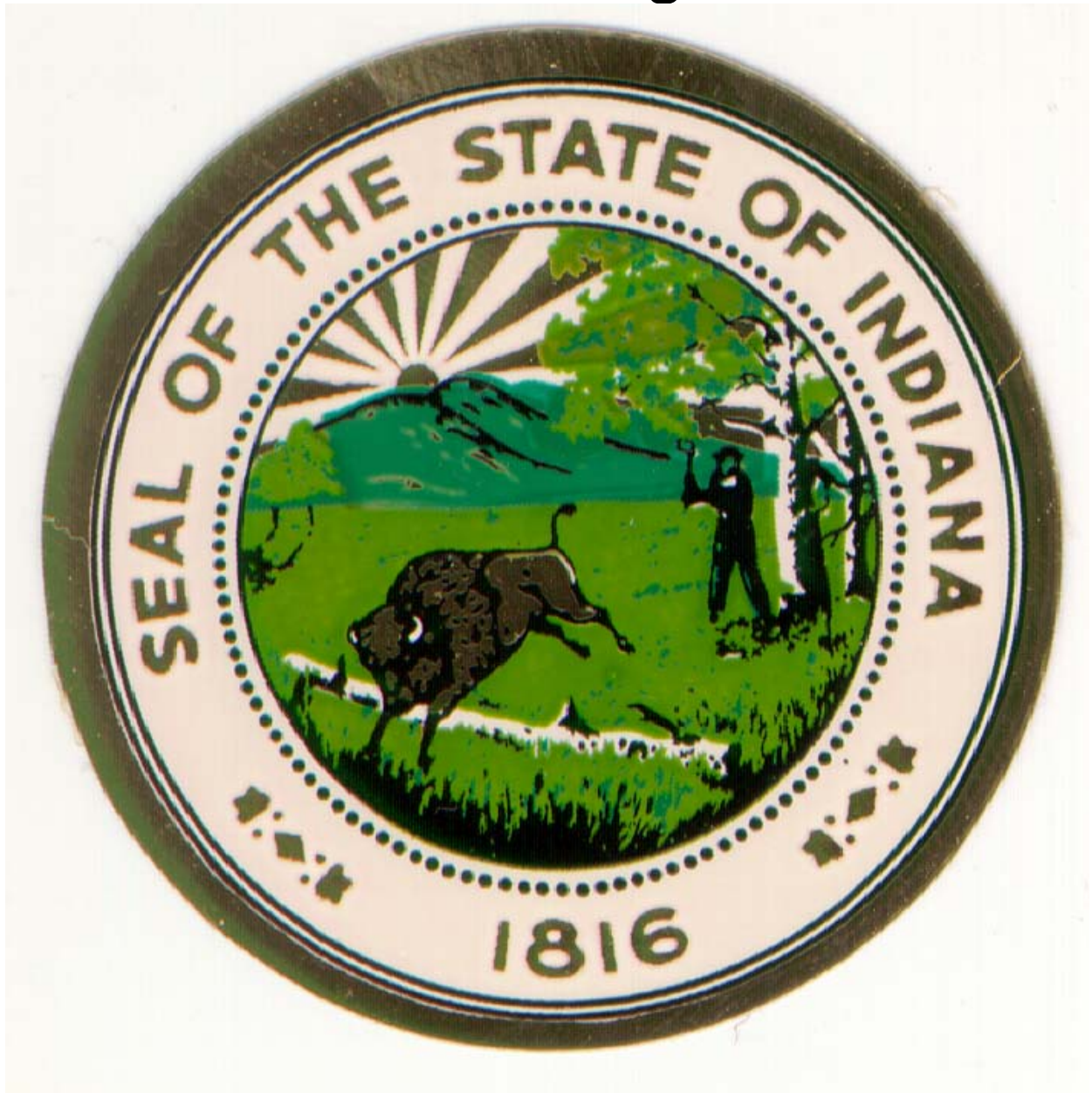
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Mitchell E. Daniels, Governor  
State of Indiana

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Date

# **The State of Indiana Standard Hazard Mitigation Plan**



Indiana Department of Homeland Security

April 25, 2005

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## **MISSION STATEMENT**

The mission of the Indiana Department of Homeland Security is to reduce and prevent the loss of life and property and protect our infrastructure and institutions from all natural and man-made hazards, by undertaking a comprehensive, risk-based emergency management program of mitigation.

## EXECUTIVE SUMMARY

The Indiana Standard Hazard Mitigation Plan was developed keeping in mind that it will provide the base upon which to build the Enhanced State Mitigation Plan for Indiana. In order to provide this foundation the Standard Plan provides information and direction for evaluating the natural hazards that threaten Indiana, and selects the appropriate action to mitigate the risk from these hazards. The plan will serve to expedite post-disaster mitigation and the use of pre-disaster resources.

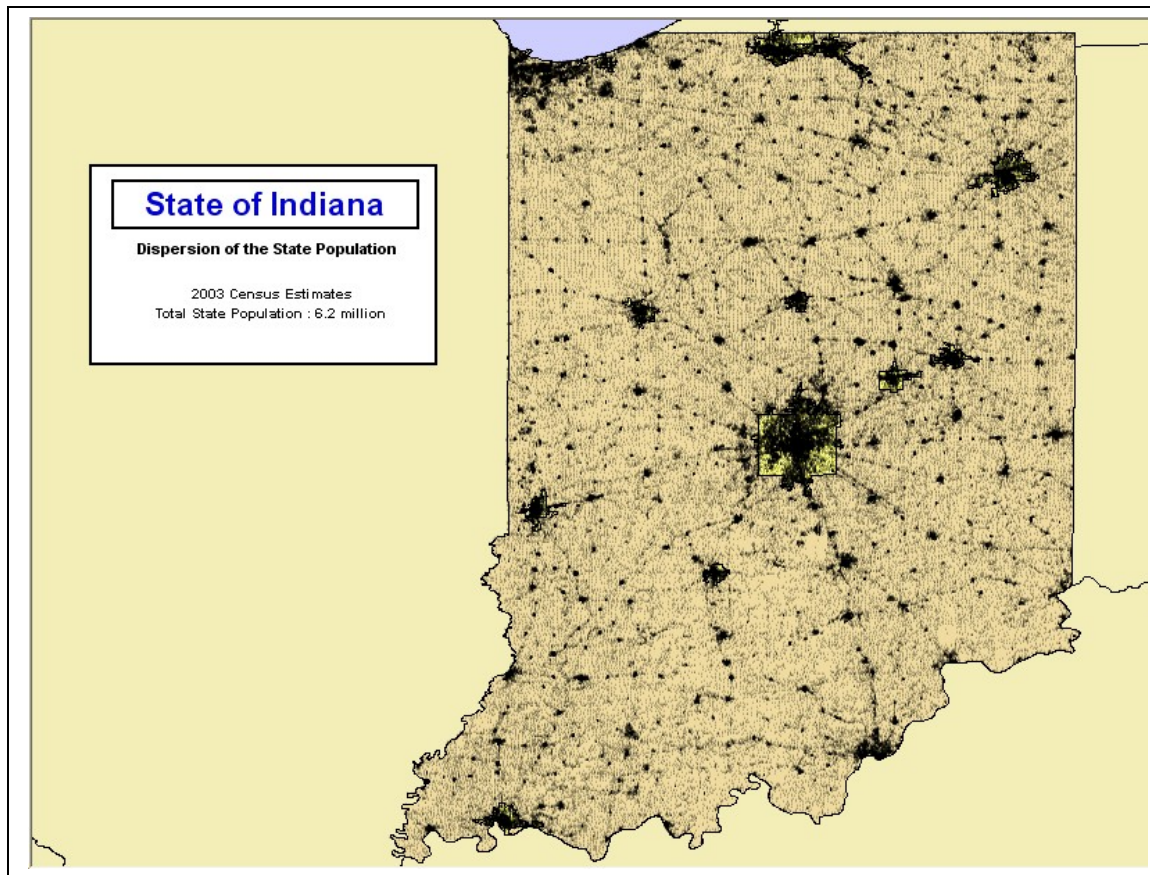
This plan is hazard specific, linking and relating mitigation opportunities to historically-demonstrated needs. Disaster histories and risk assessments are included to show the basis for the State's mitigation priorities. This plan focuses on procedures and strategies to identify mitigation opportunities and carry out mitigation actions. It serves as a guide for agencies and communities to develop mitigation programs and integrate hazard mitigation into their planning process. This plan encompasses mitigation opportunities, strategies, and actions needed at the local, state, and federal levels.

The mitigation strategies rely on working groups that bring together a broad range of government officials (e.g. building codes, planning and zoning, public works, emergency management, engineering, housing, transportation) and officials from such entities as utilities, school systems, water management districts, area businesses, insurance providers, land developers, and non-profit organizations. To assist these working groups, the Indiana Department of Homeland Security provides technical assistance in the form of training, workshops, and materials.

This hazard-based plan provides a logical framework for the presentation of the State's mitigation priorities, and is organized under each hazard, as follows:

- **Hazard Identification** defines and describes a hazard, including its magnitude and severity, probability and frequency, causative factors, and areas affected.
- **Risk Assessment** evaluated risk associated with a specific hazard and defines the risk in terms of probability and frequency of occurrence, magnitude and severity, exposure, and consequences.
- **Mitigation Goals and Projects** are plans and actions to reduce or eliminate long-term risk to people and property from the effects of natural hazards.





## INTRODUCTION

During the decade of the nineties, the State was impacted by a wide variety of events, twelve of which resulted in Federal Disaster declarations. Since 2002 Indiana has received five Presidentially declared disasters. The summer of 2003 saw two near record flooding events, which left hundreds without permanent homes. These disasters have provided the inspiration for many communities to make changes in where they live and in the way they build their infrastructure and housing. Furthermore, these events have increased residents and communities' interest in reconsidering the use of the flood plain along Indiana's rivers.

IDHS's Hazard Mitigation Division concentrates its focus on encouraging communities and state agencies to adopt sound mitigation principles and to provide tools that will help them to meet those goals. One of these tools is the new online planning tool ***Mitigationplan.com***. This program provides the local jurisdictions with the ability to input information into a database. This database will then produce an All Hazard Mitigation Plan that will be compliant with the DMA 2000 requirements. IDHS has also partnered with several Indiana



Educational institutions to conduct in-depth soil and flood analyses. The results of these studies will be provided to the local officials to aid in their Mitigation planning efforts.

The Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and the Pre-Disaster Mitigation (PDM) programs have provided the state, cities, towns, and counties of Indiana, tools to assist them in identifying, developing, and implementing projects that will further the State's efforts to build more disaster resistant communities. The resources these programs offer are only a starting point to aid communities in evaluating their risk, vulnerability, and resources in dealing with all hazards. The focus of the Indiana Department of Homeland Security is to provide the impetus to bring together emergency management professionals and related disciplines not only on the state and federal level, but also on the local levels. Forming these relationships, as evidenced by the newly formed Indiana Hazard Mitigation Council, is vital to the successful implementation of the projects outlined in this plan. A coordinated effort is needed to launch these projects as well as to implement them.

State Hazard Mitigation Planning, as reflected in the projects detailed in this plan, fall into 4 major categories:

- **Risk Identification, Assessment, & Priorities** – In coordination with other government agencies and local communities, IDHS has and will continue to identify communities at risk, especially from the major hazards affecting Indiana. These hazards include Floods, Winter Storms, Tornadoes and Windstorms, and Earthquakes. IDHS will evaluate the hazards against the objectives outlined in this plan, and then prioritize specific community projects for potential FEMA HMGP, FMA, and PDM funding.
- **Education of Emergency Management Professionals, Related Disciplines, and Community Officials** – Two important components exist to educate other interested professionals. The first is to use this plan and other state and federal emergency management resources as teaching tools to illustrate the State's immediate and long-term hazard mitigation goals, and to demonstrate the function and value of other disciplines to the overall success of the state and federal hazard mitigation program. This will help to open the doors of communication and interaction between all levels of government and throughout all agencies.

The other component, which is provided for in the projects that follow, is education of emergency and other related professionals in the "how to" of learning to use the tools of the trade available for mitigation planning and implementation (i.e. HAZUS-MH, E-grants, ArcGIS, Mitigationplan.com, federal and state environmental review process). This also includes education on what informational resources are available and where they can be found.

- **Education of Non-Government Professionals and General Public** – To effectively implement hazard mitigation principles and regulations in the community, it is crucial to educate and enlist the support of the private sector, such as contractors, insurance agents, and retail. They provide a valuable direct link to citizens and can be instrumental in disseminating information and offering choices to help prepare and provide for public safety during disasters. By involving the private sector in mitigation activities, this will further the goals of building more disaster resistant communities.
- **Promotion of Legislation Supporting Goals of Emergency Management and Promotion of Compliance of Regulations within Communities** - Recently, Indiana has established the Indiana State Hazard Mitigation Council and revised private and commercial building code regulations. IDHS is involved in promoting these actions. Both of these will be instrumental in minimizing the impact of disasters on people and communities, even to the point of saving lives. It is critical that communities and the private sector are informed and compliant with the new regulations. Since Indiana is a “home rule” state, this presents some formidable challenges. An important strategy for IDHS is creating an understanding within communities of these new regulations, to assure that the logic of their compliance is indisputable.

It is evident that planning, education and cooperation are overwhelmingly important to the success of hazard mitigation programs in the State. These activities form the foundation for HMGP, FMA, and Pre-Disaster Mitigation in communities, which in the end help to produce self-sufficiency for communities and their citizens in coping with disasters.

An extremely effective method of developing community self-sufficiency exists in the FEMA-funded, State-managed Hazard Mitigation Grant program - the acquisition, elevation, or relocation of private residences, commercial structures, and critical facilities out of the floodplain. The local jurisdiction's acquisition or relocation of structures turns land back into open space forever. When floods come to those locations, there is no adverse impact to people or the community. IDHS's priority is to encourage increased participation in this program throughout the state.

For the other major hazards affecting the State – winter storms, tornadoes and windstorms, earthquakes, and man-made hazards - Federal and State mitigation funds are instrumental in protecting infrastructure especially with such projects as overhead/underground conversion of electrical lines, enlarging culverts and bridges, shoring up sewerage systems, and retrofitting essential facilities in the community.

Indiana Mitigation's goal is to use the success of these programs and partner them with education and cooperation to increase the awareness of mitigation measures in communities and the minds of its citizens.

## 1.0 PREREQUISITES

### 1.1 Plan Adoption

This State of Indiana Hazard Mitigation Plan meets the requirements of Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Public Law 93-288, as amended). Additionally, this plan meets the minimum planning requirements under 44 Code of Federal Regulations, Part 78 (Flood Mitigation Assistance).

It is intended that this plan also meet the requirements of the Disaster Mitigation Act of 2000 (DMA2K), Section 322. Section 322 of the Act requires that States, as a condition of receiving federal disaster mitigation funds, have a mitigation plan in place that describes the planning process for identifying hazards, risk and vulnerabilities, identifies and prioritizes mitigation actions, encourages the development of local mitigation and provides technical support for these efforts. In addition, the Act requires local and tribal governments to also have mitigation plans.

The development and implementation of this plan will be carried out in accordance with the following State regulations/statutes:

**Section 106 Review** Historic Preservation and Archaeology – Indiana Code 14-21-1, Articles 19-21 -- Indiana Department of Natural Resources, SHPO, “Summary of the Key Steps for Carrying Out the Section 106 Review Process in Indiana (updated as of 6/19/00)”.

**IC 10-4-1-2: Section 2. (a)** “Because of the existing and increasing possibility of the occurrence of disasters or emergencies of unprecedented size and destructiveness resulting from man-made or natural causes, and in order to ensure that preparations of this state will be adequate to deal with such disasters or emergencies, when unpreventable, to prevent or mitigate these disasters where possible, generally to provide for the common defense and to protect the public peace, health, and safety, and to preserve the lives and property of the people of the state, it is hereby found and declared to be necessary (to):”

- a. Establish state and local emergency management programs.
- b. Authorize and provide for cooperation between departments of government in disaster prevention, preparedness, response and recovery.

- c. Provide a disaster management system embodying all aspects of pre-disaster preparedness, disaster operation and post-disaster response.

### **Indiana Governor's Executive Orders**

On January 10, 2005, Governor Daniels signed **Executive Order 05-09** Establishing and clarifying duties of state agencies for all matters relating to emergency management

"...under the provisions of IC 10-14-3, the Emergency Management and Disaster Law, the Governor is charged with the responsibility for ensuring that a comprehensive emergency management program exists that addresses all aspects of emergency and disaster mitigation, preparedness, response, and recovery;"

- Designated the Director of the Indiana Department of Homeland Security as the State Coordinating Officer for the for all matters relating to emergency and disaster mitigation, preparedness, response, and recovery in this State, and in all matters relating to the Federal Emergency Management Agency.
- Re-established and continued the Emergency Management Advisory Group and the Indiana State Mitigation Council.

This executive order superseded 03-34 enacted by the previous administration.

### **Indiana's Floodplain Ordinance IC14-28**

Flood Control – Indiana Code, Section 21, Article 28 -- Management or Development along or within waterways – Title 310, Department of Natural Resources

Restricts the development of an area designated as the 100-year floodplain. Substantial improvements to structures within the floodplain shall be in conformance with 44 CFR Part 60 January 1, 1993. (See Appendix VI-1)

Restricts reconstruction of substantially damaged structures, unless damaged by other than flooding.

Prohibits new residential development and reconstruction of flood damaged homes in the designated floodway. Additionally, the state ordinance defines the floodway as more restrictive than the Federal law.

Designates the Indiana Department of Natural Resources as the permitting agency for floodplain development and for the enforcement of the floodplain regulations. Tasks DNR to establish permit requirements. (See Title 310 Article 6 – Management or Development along or within Waterways -- Appendix VIII-1)

### **Local Regulations**

*Floodplain Ordinances* -- Designates acceptable uses for the areas designated as within the floodway and flood fringe. Places restrictions on types of

construction and its impact on the flood level within the floodplain. (See Model Local Ordinance – **Appendix VII-1**)

*Zoning and Land Use Requirements* -- restricts types of construction within the floodplain by use of zoning and land use planning.

*Community's Master Plan* -- Adoption of a plan for the overall development, redevelopment, and land use of the community. Designate areas within the floodplain for acquisition and use as green way, park, wetlands/wildlife protection, etc.

The Plan was prepared by Indiana Department of Homeland Security, with the assistance of the Indiana State Hazard Mitigation Council, who utilized input from county and local officials following disaster events. This plan was approved by the Federal Emergency Management Agency (FEMA) Mitigation Division on **April 26, 2005**.

A copy of the final plan will be provided to each agency that has a role in implementing the plan.

The Department of Homeland Security shall be responsible for the coordination, the preparation, and continuous updating of the All Hazard Mitigation Plan and will ensure that this plan is consistent with federal, county, and municipal plans.

The All Hazard Mitigation Plan has been adopted by the State of Indiana under the executive powers of the Governor, as indicated in the following proclamation.



STATE OF INDIANA  
OFFICE OF THE GOVERNOR  
State House, Second Floor  
Indianapolis, Indiana 46204

Mitchell E. Daniels, Jr.  
Governor

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Mitchell E. Daniels, Jr., Governor  
State of Indiana

A handwritten signature in black ink that reads "ME Daniels, Jr." with a stylized flourish at the end.

4-25-2005  
Date

## **Assurances/Federal Regulations**

The State of Indiana will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44CFR Section 13.11(c). The State will amend its plan whenever necessary to reflect the changes in State or Federal laws and statutes as required in 44CFR Section 13.11(d). Additionally, any recipients of the federal grant funds will comply the same.

### **Robert T. Stafford Disaster Relief and Emergency Assistance Act as Amended**

- Section 404 -- provides for funding for mitigation projects which are cost-effective and which “substantially reduce the risk of future damage, hardship, loss, or suffering in any area affected by a major disaster.”
- Section 409 -- “as a further condition of any loan or grant made under the provisions of this Act, the State or local government shall agree that...” a. Natural hazards shall be identified b. Appropriate actions shall be taken to mitigate such hazards, including safe land-use and construction practices.
- Section 406(e)(1) -- The cost of repairing, restoring, reconstructing or replacing a public facility or nonprofit facility as it existed immediately prior to the disaster and conformity with current codes, specifications and standards of floodplain management and hazard mitigation criteria shall “at a minimum, be treated as the net eligible cost” of such repair or replacement.

### **National Flood Insurance Reform Act 1994**

- Section 554 -- Established the National Flood Mitigation Fund that provides funds not to exceed \$20million for flood mitigation projects.
- Provides funding for Mitigation Planning projects to states and local jurisdictions.

### **Eligibility**

- Benefit/cost analysis criteria 44 CFR 206.434(b)(5)
- Eligibility & selection criteria 44 CFR 206.434(b)
- Planning Requirement criteria 44 CFR 206.434(b)(3)

### **Environmental**

- 44 CFR Part 10 – National Environmental Policy Act
- 44 CFR Part 9 – Executive Order 11988 (floodplain management) and Executive Order 11990 (protection of wetlands).
- National Historic Preservation Act of 1966, as amended, Section 106 (see also Indiana SHPO guidance listed under State Regulations).
- Endangered Species Act
- Executive Order 12699 – Seismic safety.
- Executive Order 12898 – Environmental justice
- FEMA’s NEPA review process is outlined in Job Aid 8-1.



- Roles of applicants and State in support of FEMA's environmental review – 44 CFR 10.7(c), Job Aid 8-2
- List of Categorical Exclusions – Job Aid 8-3.
- Extraordinary environmental circumstances that may trigger further review – 44 CFR 10.8.
- Coordinating with other agencies – 44 CFR 10.9(c), 10.10, and Council on Environmental Quality 40 CFR Parts 1500-1508.
- Clean Water Act
- National Environmental Policy Act

### **National Flood Insurance Program (NFIP)**

- National Flood Insurance Program – 44 CFR Chapter B, Parts 59-79
- Community Rating System – 44 CFR (B), Part 64

### **Grants Management**

- HMGP grants management procedures 44 CFR pt. 13
- 44 CFR Part 13 Uniform administrative requirements for grants and cooperative agreements to state and local governments.
- 44 CFR Part 14 Administration of grants: Audits of State and local governments.
- 44 CFR Part 17 Government-wide debarment and suspension (non-procurement) and government-wide requirements for drug-free workplace (grants).
- 44 CFR Part 18 New restrictions on lobbying
- 44 CFR Subchapter B – Insurance and Hazard Mitigation
- 44 CFR Subchapter C – Fire Prevention and Control
- 44 CFR Subchapter D – Disaster Assistance
- 44 CFR Part 7 – Nondiscrimination in Federally-assisted programs.

### **To the extent the following provisions apply to the award of assistance:**

Recipient possesses legal authority to enter into agreements, and to execute the proposed programs.

Recipient's governing body has duly adopted or passed as an official act a resolution, motion or similar action authorizing the execution of hazard mitigation agreements, including all understandings and assurances contained therein, and directing and authorizing the Recipient's chief administrative officer or designee to act in connection with any application and to provide such additional information as may be required.

No member of or delegate to the Congress of the United States, and no Resident Commissioner, shall be admitted to any share or part of any agreement or to any benefit to arise from the same. No member, officer, or employee of the Recipient

or its designees or agents, no member of the governing body of the locality in which the program is situated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the program during his tenure or for one year thereafter, shall have any interest direct or indirect, in any contract or subcontract, or the proceeds thereof, for work to be performed in connection with the program assisted under this plan. The Recipient shall incorporate or cause to be incorporated, in all such contracts or subcontracts a provision prohibiting such interest pursuant to the purpose state above.

All Recipient contracts for which the State Legislature is in any part a funding source, shall contain language to provide for termination with reasonable costs to be paid by the Recipient for eligible contract work completed prior to the date the notice of suspension of funding was received by the Recipient. Any cost incurred after a notice of suspension or termination is received by the Recipient may not be funded with funds provided under a grant agreement unless previously approved in writing by the Department. All Recipient contracts shall contain provisions for termination for cause or convenience and shall provide for the method of payment in such event.

Recipient will comply with:

- (1) Contract Work Hours and Safety Standards Act of 1962, 40 U.S.C. 327 et seq., requiring that mechanics and laborers (including watchmen and guards) employed on federally assisted contracts be paid wages of not less than one and one-half times their basic wage rates for all hours worked in excess of forty hours in a work week; and
- (2) Federal Fair Labor Standards Act, 29 U.S.C. Section 201 et seq., requiring that covered employees be paid at least the minimum prescribed wage, and also that they be paid one and one-half times their basic wage rates for all hours worked in excess of the prescribed work-week.

Recipient will comply with:

- (1) Title VI of the Civil Rights Act of 1964 (P.L. 88-352), and the regulations issued pursuant thereto, which provides that no person in the United States shall on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Recipient receives Federal financial assistance and will immediately take any measures necessary to effectuate this assurance. If any real property or structure thereon is provided or improved with the aid of Federal financial assistance extended to the Recipient, this assurance shall obligate the Recipient, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the Federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits;

(2) Any prohibition against discrimination on the basis of age under the Age Discrimination Act of 1975, as amended (42 U.S.C.: 6101-6107) which prohibits discrimination on the basis of age or with respect to otherwise qualified handicapped individuals as provided in Section 504 of the Rehabilitation Act of 1973;

(3) Executive Order 11246 as amended by Executive Orders 11375 and 12086, and the regulations issued pursuant thereto, which provide that no person shall be discriminated against on the basis of race, color, religion, sex or national origin in all phases of employment during the performance of federal or federally assisted construction contracts; affirmative action to insure fair treatment in employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff/termination, rates of pay or other forms of compensation; and election for training and apprenticeship.

The Recipient agrees to comply with the Americans With Disabilities Act (Public Law 101-336, 42 U.S.C. Section 12101 et seq.), where applicable, which prohibits discrimination by public and private entities on the basis of disability in the areas of employment, public accommodations, transportation, State and local government services, and in telecommunications.

Recipient will establish safeguards to prohibit employees from using positions for a purpose that is or gives the appearance of being motivated by a desire for private gain for themselves or others, particularly those with whom they have family, business, or other ties pursuant to Section 112.313 and Section 112.3135, FS.

Recipient will comply with the Anti-Kickback Act of 1986, 41 U.S.C. Section 51 which outlaws and prescribes penalties for "kickbacks" of wages in federally financed or assisted construction activities.

Recipient will comply with the provisions of 18 USC 594, 598, 600-605 (further known as the Hatch Act) which limits the political activities of employees.

Recipient will comply with the flood insurance purchase and other requirements of the Flood Disaster Protection Act of 1973 as amended, 42 USC 4002-4107, including requirements regarding the purchase of flood insurance in communities where such insurance is available as a condition for the receipt of any Federal financial assistance for construction or acquisition purposes for use in any area having special flood hazards. The phrase "Federal financial assistance" includes any form of loan, grant, guaranty, insurance payment, rebate, subsidy, disaster assistance loan or grant, or any other form of direct or indirect Federal assistance.

Recipient will require every building or facility (other than a privately owned residential structure) designed, constructed, or altered with funds provided under a grant agreement to comply with the "Uniform Federal Accessibility Standards," (AS) which is Appendix A to 41 CFR Section 101-19.6 for general type buildings and Appendix A to 24 CFR Part 40 for residential structures. The Recipient will be responsible for conducting inspections to ensure compliance with these specifications by the contractor;

Recipient will, in connection with its performance of environmental assessments under the National Environmental Policy Act of 1969, comply with Section 106 of the National Historic Preservation Act of 1966 (U.S.C. 470), Executive Order 11593, 24 CFR Part 800, and the Preservation of Archaeological and Historical Data Act of 1966 (16 U.S.C. 469a-1, et seq.) by:

- (1) Consulting with the State Historic Preservation Office to identify properties listed in or eligible for inclusion in the National Register of Historic Places that are subject to adverse effects (see 36 CFR Section 800.8) by the proposed activity; and

- (2) Complying with all requirements established by the State to avoid or mitigate adverse effects upon such properties.

- (3) Notifying FEMA and the state if any project may affect a historic property. When any of Recipient's projects funded under a grant agreement may affect a historic property, as defined in 36 CFR 800.2(e), the Federal Emergency Management Agency (FEMA) may require Recipient to review the eligible scope of work in consultation with the State Historic Preservation Office (SHPO) and suggest methods of repair or construction that will conform with the recommended approaches set out in the Secretary of Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings 1992 (Standards), the Secretary of the Interior's Guidelines for Archeological Documentation (Guidelines) (48 Federal Register 44734-37), or any other applicable Secretary of Interior standards. If FEMA determines that the eligible scope of work will not conform with the Standards, Recipient agrees to participate in consultations to develop, and, after execution by all parties, to abide by, a written agreement that establishes mitigation and recondition measures, including but not limited to, impacts to archeological sites, and the salvage, storage, and reuse of any significant architectural features that may otherwise be demolished.

- (4) Notifying FEMA and the state if any project funded under a grant agreement will involve ground disturbing activities, including, but not limited to: subsurface disturbance; removal of trees; excavation for footings and foundations; and installation of utilities (such as water, sewer, storm drains, electrical, gas, leach lines and septic tanks) except where these activities are restricted solely to areas previously disturbed by the

installation, replacement or maintenance of such utilities. FEMA will request the State Historic Preservation Officer's (SHPO) opinion on the potential that archeological properties may be present and be affected by such activities. The SHPO will advise Recipient on any feasible steps to be accomplished to avoid any National Register eligible archeological property or will make recommendations for the development of a treatment plan for the recovery of archeological data from the property.

If Recipient is unable to avoid the archeological property, it will develop, in consultation with the SHPO, a treatment plan consistent with the Guidelines and take into account the Advisory Council on Historic Preservation (Council) publication "Treatment of Archeological Properties". Recipient shall forward information regarding the treatment plan to FEMA, the SHPO and the Council for review. If the SHPO and the Council do not object within 15 calendar days of receipt of the treatment plan, FEMA may direct Recipient to implement the treatment plan. If either the Council or the SHPO object, Recipient shall not proceed with the project until the objection is resolved.

(5) Notifying the state and FEMA as soon as practicable: (a) of any changes in the approved scope of work for a National Register eligible or listed property; (b) of all changes to a project that may result in a supplemental DSR or modify an HMGP project for a National Register eligible or listed property; (c) if it appears that a project funded under a grant agreement will affect a previously unidentified property that may be eligible for inclusion in the National Register or affect a known historic property in an unanticipated manner. Recipient acknowledges that FEMA may require Recipient to stop construction in the vicinity of the discovery of a previously unidentified property that may be eligible for inclusion in the National Register or upon learning that construction may affect a known historic property in an unanticipated manner. Recipient further acknowledges that FEMA may require Recipient to take all reasonable measures to avoid or minimize harm to such property until FEMA concludes consultation with the SHPO. Recipient also acknowledges that FEMA will require, and Recipient shall comply with, modifications to the project scope of work necessary to implement recommendations to address the project and the property. (7) Acknowledging that, unless FEMA specifically stipulates otherwise, it shall not receive funding for projects when, with intent to avoid the requirements of the PA or the NHPA, Recipient intentionally and significantly adversely affects a historic property, or having the legal power to prevent it, allowed such significant adverse affect to occur.

With respect to demolition activities, recipient will:

1. Create and make available documentation sufficient to demonstrate that the recipient and its demolition contractor have sufficient manpower and equipment to comply with the obligations as outlined in a grant agreement.
2. Return the property to its natural state as though no improvements had ever been contained thereon.
3. Furnish documentation of all qualified personnel, licenses and all equipment necessary to inspect buildings located in Recipient's jurisdiction to detect the presence of asbestos and lead in accordance with requirements of the U.S. environmental Protection Agency, the Indiana Department of Environmental Management and the County Health Department.
4. Provide documentation of the inspection results for each structure to indicate:
  - a. Safety Hazards Present
  - b. Health Hazards Present
  - c. Hazardous Materials Present
5. Provide supervision over contractors or employees employed by Recipient to remove asbestos and lead from demolished or otherwise applicable structures.
6. Leave the demolished site clean, level and free of debris.
7. Notify the Department promptly of any unusual existing condition which hampers the contractors work.
8. Obtain all required permits.
9. Provide addresses and marked maps for each site where water wells and septic tanks are to be closed along with the number of wells and septic tanks located on each site. Provide documentation of closures.
10. Comply with all applicable standards, orders, or requirements issued under the Clean Air Act and the Clean Water Act U.S. Environmental Protection Agency regulations (40 CFR Part 15 and 61). This clause shall be added to any subcontracts.
11. Provide documentation of public notices for demolition activities.

## 2.0 PLANNING PROCESS

### 2.0 Documentation of the Planning Process

The Indiana Department of Homeland Security is the lead agency responsible for coordinating the development of the State's Enhanced Hazard Mitigation Plan. The Mitigation Division assumes the lead in the planning efforts. The Mitigation Division is assisted by various other state agency representatives, who serve on the Indiana State Hazard Mitigation Council (ISHMC).

The ISHMC was first activated following the Federal Disaster DR-1418-IN in the summer of 2003. The Council was created under Executive Order 03-34. This council was a direct evolution of the Interagency Hazard Mitigation Team which was first activated following the flood disaster Fort Wayne suffered in the early winter of 1982, pursuant to the December, 15, 1980 Interagency agency Agreement for Nonstructural Damage Reduction to identify mitigation opportunities and issues. The Council will work to assure that the State follows mitigation principles during the design and construction of state facilities or state-funded projects. The Council will also work to encourage and inform the inhabitants of the state of the necessity of mitigation activities in all levels of government and their communities. This ISHMC will also assist in the development, implementation, and maintenance of the State's All Hazard Mitigation Plan. The Council will assist IDHS in developing state mitigation goals and objectives, state agency capability analysis, and the identification of funding sources and statewide mitigation projects.

Individual members of the Council bring their varied background, specialized expertise, and perspectives together to create interagency, interdisciplinary insight to identify hazard vulnerability and evaluate mitigation plans and projects. The interagency aspect of the team diffuses political pressure on the grantee agency and eases the burden of resources. The following agencies have been appointed to serve on the Council.

**TABLE 2-1- INDIANA STATE HAZARD MITIGATION COUNCIL**

Indiana Dept. of Transportation (INDOT)	Professional Standards Board
Indiana Dept. of Natural Resources (DNR)	Health Professions Board
Indiana Dept. of Environmental Management	Indiana State Police
Indiana State Dept. of Health	Military Department of Indiana
Indiana Dept. of Commerce	State Auditor
Indiana Housing Finance Authority	Worker's Compensation Board
Indiana Dept of Homeland Security (IDHS)	Attorney General
Indiana Dept. of Insurance	Utility Regulatory Commission
Indiana Dept. of Labor	State Budget Agency
Indiana Dept. of Revenue	State Board of Accounts



Indiana Dept. of Family and Social Services Indiana Dept. of Fire and Building Services Indiana Dept. of Personnel Indiana Dept. of Workforce Development Indiana Dept. of Correction Indiana Dept. of Administration Indiana Dept. of Education Indiana Dept. of Local Government Finance Indiana Dept. of Financial Institutions Indiana Military Department of the State Office of Secretary of State Office of Treasurer of State Governor's Council on People with Disabilities Alcohol and Tobacco Commission	State Board of Animal Health Civil Rights Commission Public Safety Training Institute Law Enforcement Training Board Office of Commissioner of Agriculture Commodity Warehouse Licensing Agency Bureau of Motor Vehicles Port Commission Commission of Public Records State Office Building Commission Information Technology Oversight Commission Gaming Commission Intelnet Commission
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**Executive Order 89-12** established the Indiana Department of Homeland Security and tasked it with coordinating the State's comprehensive disaster management system for the protection of its citizens.

**Executive Order 03-34** designates the Director of the Indiana Department of Homeland Security as the State's Coordinating Officer for the purpose of coordinating all emergency and disaster mitigation, preparedness, and response and recovery activities in Indiana.

**Executive Order 05-09** superseded the above and in doing so combined both orders in to a single executive order continuing the principles put forth in these documents and re-establishing the Emergency Management advisory group and the Indiana State Hazard Mitigation Council. It tasks the council to not only to identify projects, but to promote mitigation practices and principles within local and state government and the public.

### **Mitigation Planning Process**

The first step in hazard mitigation planning is the development of a planning process or strategy. The planning team will utilize the following planning process in the development and maintenance of the State's All Hazard Mitigation Plan:

- Organize Resources
- Seek Public Participation in the Planning Process
- Develop Goals and Objectives
- Review State and Local Hazard Analysis and Risk Assessments
- Identify Existing Resources
- Identify Mitigation Alternatives
- Development Plan Maintenance Policies
- Approve Plan

### **Implementation and Maintenance**

The Indiana State Hazard Mitigation Officer (SHMO) shall be responsible for the maintenance and implementation of this plan. The SHMO is also responsible for monitoring the funding and implementation of mitigation projects in the state administered by the Indiana Department of Homeland Security.

### **Monitoring**

The SHMO and ISHMC will monitor the plan with each declared disaster for the continued relevancy of its goals and objectives. They are also responsible for determining whether funded projects have been effective in achieving these goals. They will determine whether the designated strategies and measures have been effective in reducing losses due to the natural hazards they were designed to mitigate against and if they have reduced losses from other hazards.

Several projects in this plan stipulate an “ongoing” timeline. The Indiana Department of Homeland Security will update these projects each year, by altering the objectives, if needed, and reporting on the status.

### **Evaluation, Updating, Expansion**

When there are no declared disasters, the SHMO will update and expand this plan yearly to include other natural and man-made hazards that threaten the citizens of the State of Indiana, and delete or add mitigation goals, or legislative changes.

The plan will be expanded on the basis of a continuing evaluation of the hazards that consistently cause:

- **Loss of life**
- **Damage and destruction of property**
- **Negative impact on the state’s economic and social structure**

## **2.2 Coordination among Agencies and Integration with other Planning Efforts**

As previously described IDHS mitigation division worked, with the assistance of the Governor’s office as a result of the July 4<sup>th</sup> flood of 2003, to create the Indiana State Hazard Mitigation Council. The Governor’s Executive Order (03-34) established the Council and tasked it with the coordination of the states existing (and to this point) unrecognized mitigation efforts in state activities (This executive order was superceded by 05-09 in January, 2005). The council serves as a means to coordinate mitigation efforts (both projects and planning efforts pre and post disaster). The members of the council are listed in section 2.0 of this plan and table 2-1.

The council designated the following agencies, private partners, and organizations to assist the council in its statewide planning efforts. The designees all participate in projects or planning activities that directly impact the

mitigation goals of the state and local jurisdictions. The members of the subcommittee include, but are not limited to the following:

Indiana Department of Homeland Security--  
Earthquake Program Manager  
Public Assistance Officer  
State Planner  
Local Planner  
Department of Natural Resources --  
Division of Water Dam Safety  
Flood Plain Management  
Department of Transportation  
Indiana Housing Finance Authority  
Regional Planning Commission

Indiana Department of Environmental  
Management  
Department of Administration –  
Land Office  
Facility Management  
Indiana Geological Survey  
Indiana GIS Commission  
Maumee River Basin Commission  
Local EMA Director  
Local Flood Plain Manager

The members will with the assistance of the Polis Center, National Weather Service, Purdue University's Civil Engineering Division, and Rose Hulman University develop a State Risk and Vulnerability Assessment. This assessment will better reflect the need for Indiana to continue its planning efforts in order to reduce or eliminate the vulnerability to natural and man-made hazards. In doing so, the council will further develop the state mitigation goals and oversee the state's efforts to implement the objectives and tasks in the state's operations to achieve these goals.

Members were chosen not only on the basis of direct impact on state facilities and operations or coordination with local units of government that can have an impact on their mitigation activities, but also because they are involved in other planning alternatives. The representation on the sub committee by the State Planner, Local Planner and Homeland Security Planner represents the effort to coordinate all of IDHS's planning activities, and most importantly the development of a comprehensive risk and vulnerability assessment for the entire state. The goal is to make this risk assessment one that will serve as a reference document for all state and local agencies.

Regional planning commissions and Indiana Housing Finance Authority work directly with local jurisdictions to assist in comprehensive planning for development and/or economic growth within their member communities. Furthermore, they are tasked with assisting the communities in implementing the planning goals of the communities. The Departments of Transportation, Natural Resources and Administration within their scope of work are involved in (both short and long term) planning and implementation for the improvement of state facilities and infrastructure.

The Dam Safety and Floodplain sections of Department of Natural Resources' Division of Water work directly with not only state programs, but also with local jurisdictions and private development and dam owners in programs that directly impact the residents of the state (flood hazards). They are involved in state mapping of the floodplains and the Emergency Action Plans for dam owners and

operators. The Dam Safety section also oversees the maintenance of private and public levees and the improvements of these structures.

The Maumee River Basin Commission is a state commission that coordinates the storm water and flood control activities in the counties that make up the Maumee River watershed. They have been a model in their active pursuit of flood plain management and mitigation projects and planning for their member counties.

Indiana Department of Environmental Management works with local jurisdictions (counties) and private industry to maintain and develop Local Emergency Planning Committees to deal with the transportation, storage and use of hazardous materials. These committees were established not only for the protection of the natural environment, but also the protection of their citizens that may by accident become exposed to these materials.

The Indiana GIS Commission was tasked by the Governor's office to coordinate the development of a statewide repository of maps and overlaying layers of data for the use of Hoosiers and their governmental agencies. Additionally, they were tasked to ensure that sensitive data was available only on a "need to know" basis. This would include specific data what may be necessary for responding agencies to have access to in order to manage incidents that may occur, but do not have a direct use by the public at large. For example, the location of police stations may have a direct use by the public. However, the nature of construction, security systems, the location of prisoners or ammunition storage of the police station has would not have a general application to the public at large. Most important is the commission's expertise in the use of GIS for mapping in the development of the states risk assessment.

By invitation of the Governor the subcommittee will include private business and industry in their planning activities. Although all industries and businesses have developed their own planning efforts, the committee will try to include businesses that have direct knowledge of mitigation activities.

## **2.3 Coordination with Agencies through the Project Development Process**

Agency coordination during project development aids in project scoping. This coordination also saves time later on when FEMA undertakes the environmental review process in compliance with the National Environmental Policy Act, Executive Orders for Wetlands, Floodplains, Environmental Justice, and Earthquake, Section 106 of the National Historic Preservation Act, Section 7 of the Endangered Species Act, Section 404 of the Clean Water Act, and other environmental laws and regulations.

As evident in the chart below, all projects require review by the State Historic Preservation Officer (SHPO) with regard to potential impacts to historic structures as well as archaeological resources. Any project that could potentially disturb biological resources, either directly or indirectly will require review by the U.S.

Fish & Wildlife Service for potential impact on threatened or endangered species and mitigation of those impacts. Any project that results in a direct or indirect impact on any waterway, water body, or wetland requires review by the U.S. Army Corps of Engineers (USACE) (see chart at the end of this chapter for USACE jurisdictions within Indiana). Projects located in the floodplain or that indirectly impact the floodplain will require consultation with FEMA's floodplain specialist. These are the major points of contact to satisfy FEMA's environmental review requirements for most Hazard Mitigation Grant projects. However, if any Environmental Circumstances (44 CFR, pt. 10) are triggered, then further agency consultation and more extensive environmental documentation would be necessary from agencies reflected in the chart at the end of this chapter, "Agency Coordination By Environmental Issue".

Federal consultation requirements do not obviate the need for consultation and compliance with State requirements. For example, consultation with state agencies is needed in the following situations - any action within the floodway requires consultation with Indiana Department of Natural Resources (IDNR) Division of Water, any new or remodel building construction needs to comply with the UBC/URC, and any action disturbing the environment must also comply with state-listed threatened or endangered species in consultation with the Indiana Department of Natural Resources.

Consultation with the Indiana Department of Natural Resources will comply with state regulations to protect state-listed threatened and endangered species. The chart at the end of this chapter, "Agency Coordination By Environmental Issue" specifically identifies state agencies that need to be consulted.

**Table 2-2 Project Coordination**

<b>Normal Channels of Coordination By Project Type</b>	
<b>Acquisitions/Elevations</b>	IDHS, FEMA Region V-Hazard Mitigation Grant Program, State Historic Preservation Officer, U.S. Fish & Wildlife Service, Indiana Dept. of Natural Resources local land use & planning depts.
<b>Culverts &amp; Bridges</b>	IDHS, FEMA Region V-Hazard Mitigation Grant Program, State Historic Preservation Officer, U.S. Fish & Wildlife Service, Indiana Dept. of Natural Resources, Indiana Dept. of Transportation, U.S. Army Corps of Engineers, FEMA floodplain specialists, local public works dept., watershed district.
<b>Detention Basins</b>	IDHS, FEMA Region V-Hazard Mitigation Grant Program, State Historic Preservation Officer, U.S. Fish & Wildlife Service, Indiana Dept. of Natural Resources, U.S. Army Corps of Engineers, FEMA floodplain specialists, local public works dept., watershed district.

<b>Ring Levees</b>	IDHS, FEMA Region V-Hazard Mitigation Grant Program, State Historic Preservation Officer, U.S. Fish & Wildlife Service, Indiana Dept. of Natural Resources, U.S. Army Corps of Engineers, FEMA floodplain specialists, local watershed district, local planning dept.
<b>Slope/Bank Stability</b>	IDHS, FEMA Region V-Hazard Mitigation Grant Program, State Historic Preservation Officer, U.S. Fish & Wildlife Service, Indiana Dept. of Natural Resources, Indiana Geological Survey, U.S. Geological Survey, local planning dept.
<b>Earthquake Retrofit &amp; Safe Rooms</b>	IDHS, FEMA Region V-Hazard Mitigation Grant Program, U.S. Geological Survey, Central United States Earthquake Consortium, Indiana Geological Survey, State Historic Preservation Officer, U.S. Fish & Wildlife Service, Indiana Dept. of Natural Resources, local building department

### **State Agencies' Responsibility & Mitigation Programs**

- **Office of the Governor**

- **Function:** Under Indiana Law the Governor is responsible for the Coordination of all Indiana's emergency/disaster management system including mitigation programs.
- **Resource for Mitigation:** The Governor can request appropriations from the General Assembly for disaster assistance whenever he/she deems it necessary for the protection of all citizens.

The Authority of an Executive Order can establish and require that the state, its agencies and departments and local communities adopt mitigation strategies and principles as part of their governing or regulatory functions.

- **Indiana Department of Homeland Security (IDHS)**

- **Function:** IDHS serves as administrator and coordinator of the State's mitigation projects that have been funded by the federal government through FEMA.
- **Resource for Mitigation:** The State Hazard Mitigation Officer serves as a member of the Indiana State Hazard Mitigation Council (ISHMC). The ISHMC identifies mitigation projects, evaluates hazards and prioritizes projects for funding. To implement HMGP projects, IDHS coordinates with all the agencies listed here, as needed.

- **Indiana Department of Transportation (INDOT)**

- **Function:** Construction and maintenance of the major state and federal highways and interstates and related infrastructure within the state.

- **Areas of Interest:** Construction and improvement of bridges, culverts, and roadways to earthquake and flood reduction requirements.
- **Resources for Mitigation:** Provides technical assistance for relocation of critical facilities, relocation of bridges, and upgrading of culverts. Member of the ISHMC.

- **Indiana Department of Natural Resources (IDNR)**

- **Function:** Regulates the state's rivers, streams, reservoirs, lakes and floodplains. Administers and enforces National Flood Insurance Program regulations and State Floodplain regulations. Advises local communities regarding enforcement of their floodplain ordinances.
- **Areas of Interest:** Historical & archaeological resources, threatened or endangered species, administers the Dam Safety Act - inspection, enforcement, and permitting. The IDNR, Division of Water, is the principal State agency that cooperates in USGS data-collection programs. Currently, more than 80 percent of the continuous hydrologic data-collection activity is maintained through efforts cooperatively funded by the IDNR and the USGS.
- **Resources for Mitigation:**  
**Indiana State Historic Preservation Office** – Section 106 of the National Historic Preservation Act requires that Federal agencies “take into account the effect of the undertaking (proposed Project) may have on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register (of Historic Places)”. FEMA, in coordination with the State Historic Preservation Officer (SHPO), must identify effects of the actions. FEMA must then obtain concurrence from the SHPO on the eligibility of the identified resource and the potential to affect it. If there are adverse effects, FEMA, in cooperation with the applicant and Grantee, enters into consultation with the SHPO on way to avoid or mitigate effects to cultural resources and develop a project-specific agreement with the SHPO that identifies the agreed-upon measures to mitigate effects. FEMA may consult with the Advisory Council on Historic Preservation in some situations.

**Threatened or Endangered Species** – Coordination early in project development to determine potential effects on threatened or endangered species. Does not exclude the need for coordination with U.S. Fish & Wildlife.

**Hydrological Studies**--maintains records of lake, stream, and river levels necessary for proper identification of flooding hazards.

Member of the ISHMC.

- **Indiana Geological Survey**

- **Function:** Provides services to the state of Indiana that contributes to the wise stewardship of its citizenry through the gathering and interpretation of relevant geological information. This mission is carried out through a combination of the following activities: geologic sample and data collection



and storage, information dissemination (in the form of published maps, reports and databases), educational outreach programs, focused research initiatives and cooperative investigations with governmental agencies, industries and educational organizations. A member of the Association of Central United States Earthquake Consortium.

- **Resources for Mitigation:** Consultation on geologic features and soil types, subsidence, slope stability.

Member of the Mitigation Planning Subcommittee

- **Indiana Department of Environmental Management (IDEM)**

- **Function:** Construction and upgrading of water and waste treatment facilities by means of Federal Environmental Protection Agency funding.
- **Areas of Interest:** Identify disaster environmental concerns and issues and mitigation projects.
- **Resources for Mitigation:** Technical assistance concerning Superfund sites. Member of the ISHMC.

- **Indiana State Department of Health**

- **Function:** Identifies and monitors issues that may affect the public health within the area of a disaster, i.e., well contamination, disease and vector control, etc.
- **Areas of Interest:** Public health.
- **Resources for Mitigation:** Member of the ISHMC.

- **Indiana Department of Commerce**

- **Function:** Provides funding under the Community Development Block Grant Program and Economic Development Program for infrastructure construction/improvement and commercial property acquisition/relocation in designated mitigation projects.
- **Resources for Mitigation:** Can supply matching funds to communities for acquisition/elevation projects under the Community Development Block Grant (CDBG) program. Provides technical assistance to communities through EDA programs.

Member of the ISHMC.

- **Indiana Housing Finance Authority**

- **Function:** Funding for construction of housing through its low to moderate income housing, senior citizen housing, etc.
- **Resources for Mitigation:** Funding for relocation of floodplain residents, i.e. new housing.

Member of the ISHMC.

- **Indiana General Assembly**

- **Function:** Responsible for writing, enacting and funding laws to require those mitigation principles are met and programs funded.
  - **Resources for Mitigation:** Funding of state disaster assistance to local communities and state agencies. Under the funding authority, they can assist communities that are unable to meet the matching requirements of the federal grant program.
- **Federal Emergency Management Agency**
    - **Function:** Administers and coordinates a variety of disaster and emergency management programs and funding programs available under the Stafford Act and the Earthquake Hazards Reduction Act. Administers and coordinates the National Flood Insurance Program and its funding of mitigation projects and programs. Assists communities and their citizens to recover from Presidential declared disasters and works to prevent future disasters.
    - **Resources for Mitigation:** Provides a federal 75% match Hazard Mitigation Grant Program, for community hazard mitigation projects. Provides technical assistance to the State and communities toward the implementation of these projects. Undertakes eligibility, benefit/cost, and environmental reviews of Hazard Mitigation projects. Administers the National Flood Insurance Program, and provides technical assistance to the state and communities to effectuate compliance with NFIP regulations. Under NFIP, mitigation resources to the community also include FMA and CRS.

## COMMUNITY RATING SYSTEM

The Community Rating System (CRS) provides a discount in flood insurance premiums to property owners in participating communities. CRS credit points are given for a wide range of floodplain management activities, and the total of these points determines the amount of the discount.

**Figure 1** shows the number of NFIP flood insurance policies in CRS communities in Indiana. Figure 1 also shows the amount of premium paid for those policies and the savings those property owners realizes from their community's participation in the CRS. Policies for properties within the Special Flood Hazard Area (SFHA) in communities in Class 9 and better communities receive a discount of 5% per class. Thus, the premium for property in the SFHA in a CRS Class 7 community is reduced 15%. The premium for property outside the SFHA is reduced by 10 % for Class 1-6 communities, and 5 % for Class 7-9 communities. Preferred Risk Policies do not receive a CRS discount because they already receive a favorable rate.

**Figure 1** Policies, Premiums, and CRS Savings for participating Indiana CRS Communities

POLICIES IN FORCE	PREMIUM	CRS SAVINGS
4,719	\$2,262,619	\$150,100

Altogether, about 5% of all NFIP communities participate, representing about two-thirds of all NFIP policies. These figures may be an approximate figure because some activity credits are increased by a population growth factor. Also, these credits are those currently effective through October 1, 2003 and do not

<b>FIGURE 3. INSURANCE DATA</b>				
<b>COMMUNITY</b>	<b>CRS CLASS</b>	<b>NFIP POLICIES</b>	<b>ANNUAL PREMIUM</b>	<b>CRS REDUCTION</b>
ALLEN COUNTY	9	178	\$78,873	\$3,393
BARTHOLOMEW COUNTY	9	292	\$135,166	\$6,335
COLUMBUS	9	369	\$199,509	\$9,648
DECATUR	9	70	\$28,795	\$1,368
EVANSVILLE	9	472	\$203,641	\$8,232
FORT WAYNE	8	1,061	\$589,104	\$55,580
HAMILTON COUNTY	8	86	\$44,405	\$3,963
HANCOCK COUNTY	9	124	\$60,404	\$2,770
KOKOMO	8	176	\$71,869	\$5,981
KOSCIUSKO COUNTY	9	530	\$223,059	\$10,283
MILFORD JUNCTION	9	5	\$7,415	\$382
NOBLESVILLE	8	192	\$91,981	\$7,851
NORTH WEBSTER	9	13	\$5,132	\$235
SYRACUSE	9	30	\$15,464	\$749
VANDERBURGH COUNTY	8	465	\$211,976	\$19,175
VIGO COUNTY	9	656	\$295,826	\$14,154
CLASS 9 OR BETTER COMMUNITIES		4,719	\$2,262,619	\$150,100
CLASS 10 COMMUNITIES		21,907	\$11,817,042	\$0
ALL COMMUNITIES		26,626	\$14,079,661	\$150,100

reflect more recent activity. In addition note that the percent savings will not exactly equal the class discounts of 5%, 10%, etc. since the total premium paid include the federal policy fee which is not discounted. Also, as mentioned above, Preferred Risk Policies do not receive a CRS discount.

Additional benefits a community realizes from participation in the CRS include:

1. The CRS floodplain management activities provide enhanced public safety, a reduction in damage to property and public infrastructure, avoidance of economic disruption and losses, reduction of human suffering, and protection of the environment.
2. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.
3. Technical assistance in designing/implementing some activities is available at no charge.
4. A CRS community's flood program benefits from having an added incentive to maintain its flood programs over the years. The fact that the community's CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new development, should be taken into account by the governing board when considering such actions. A similar system used in fire insurance rating has had a strong impact

on the level of support local governments give to their fire protection programs.

5. Implementing some CRS activities, such as floodplain management planning, can help a community qualify for certain federal assistance programs.

The following is a brief description of the eighteen-(18) activities that receive credit under the Community Rating System.

**CRS** Recognized Mitigation activities which result in the awarding of points for CRS accreditation.

300 Series - Public information	450 - Stormwater Management
310 - Elevation Certificates	500 Series - Flood Damage Reduction
320 - Map Information	510- Floodplain Management Planning
330 - Outreach Projects	520 - Acquisition and Relocation
340 - Hazard Disclosure	530 - Flood Protection
350 - Flood Protection Information	540 - Drainage System Maintenance
360 - Flood Protection Assistance	610 - Flood Warning
400 Series - Mapping & Regulations	620 - Levee Safety
410- Additional Flood Data	630 - Dam Safety
420 - Open Space Preservation	
430 - Higher Regulatory Standards	
440 - Flood Data Maintenance	

## **FLOOD MITIGATION ASSISTANCE**

The Flood Mitigation Assistance Program (FMA) was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA regulations can be found in 44 CFR Part 78. Funding for the program is provided through the National Flood Insurance Fund. FMA is funded at \$20 million nationally.

FMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP).

There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include the elevation, acquisition, and relocation of NFIP-insured structures.

It is sometimes beyond the applicant's technical and financial resources to provide the complete technical information required for a full eligibility or environmental review of a complex project. The State and Region may provide technical assistance to the applicant to develop this complete body of technical data by approving an application to complete a Phase I design, engineering, environmental, or feasibility study.

## **PRE-DISASTER MITIGATION COMPETITIVE**

The Disaster Mitigation Act of 2000 (*PUBLIC LAW 106-390—OCTOBER. 30, 2000*) brought significant changes to the FEMA mitigation programs. The act amended the Stafford Act changing the funding method of the Hazard Mitigation Grant Program, set mitigation planning standards for state and local governments and created the Pre-Disaster Mitigation Competitive Grant. The PDM-C Grant provides for a nationally competitive grant program for cost effective projects. Projects cannot be over \$3 million federal share; however there are no restrictions on the number of applications a community can submit each year. Additionally, "a State or local government may use not more than 10

percent of the financial assistance received by the State or local government under this section for a fiscal year to fund activities to disseminate information regarding cost-effective mitigation technologies.” The Program provided approximately \$120 million in funds for federal fiscal year 2003.

The regulations for the administration of the grant rank the projects according to their overall Cost Benefit Ratio, feasibility, the ability to provide a solution to a significant problem or concern to the community applying for the grant, and the communities’ commitment to mitigation and mitigation planning. The heaviest weight to the grading is the projects overall cost benefit ratio which during the first round of application provided 51% of the applications ranking. In doing this, the program hopes to ensure that the projects that provide the greatest fiscal benefit to the federal, state, local governments and the taxpayers are funded.

The program also provides funding for mitigation planning. Planning applications are evaluated separately from the project funding, but the grant money is from the same “pool” of funding. The PDM-C effective November 1, 2003 requires that a community have a FEMA approved mitigation plan in order to receive a project grant award. This requirement makes the availability planning grants more important for locals who have not developed mitigation plans.

- **U.S. Fish & Wildlife Service**

- **Function:** Administers Section 7 of the Endangered Species Act.
- **Resources for Mitigation:** Requires environmental consultation and documentation for all hazard mitigation grant projects to reach an effect/no effect determination of the project’s impact on threatened or endangered species. Initially, the presence of threatened or endangered species in a project area is determined. If these species are found, consultation with USFWS follows to determine mitigation for the effect on these species. The mitigation is usually a construction window or a construction method to minimize or avoid significant impacts on these species. The environmental documentation becomes part of the Hazard Mitigation Grant application.
  - Review Clean Water Act permits for wastewater discharges, wetland fill and development.
  - Under Fish and Wildlife Coordination Act, report on impacts to fish and wildlife of federal or federally funded projects.
  - Consult with federal agencies to ensure compliance with the Endangered Species Act.

- **U.S. Army Corps of Engineers**

- **Function:** Responsible for permitting of construction projects within the navigable waters of the United States and the design and construction of flood control projects along rivers and waterways, coastal areas etc. This includes construction of flood control dams, flood walls and levees for cities and towns. Also, responsible for identification and regulation of wetlands.

- **Resources for Mitigation:** All projects that may affect streams, rivers, lakes, oceans, wetlands, or any waters of the U.S. may require a U.S. Army Corps of Engineers Clean Water Act permit to proceed. In these cases, the applicant should work with the U.S. Army Corps of Engineers to develop the project and consider alternatives to avoid impacts to wetlands and other significant resources. This coordination complies with Section 404 of the Clean Rivers Act, and Section 10 of the Rivers and Harbors Act.

Any hazard mitigation grant project that has the potential for affecting wetlands or waterways requires documentation of consultation with USACE. This includes projects as flood control dams, flood walls, berms, detention ponds, bridges, and any project that would traverse or impact a wetland.

- **U.S. Dept. of Housing & Urban Development**

- **Function:** HUD may provide statutory (for Presidentially declared disasters) and regulatory waivers in the CDBG and HOME programs to increase the flexibility and the effectiveness of using funds for disaster recovery.
- **Resource for Mitigation:** Disaster Recovery Supplemental grants (DRI) provides flexible grants to help cities, counties, and States recover from Presidentially-declared disasters, especially in low-income areas.
- **Purpose:** When disasters occur, Congress may appropriate additional funding for the CDBG and HOME programs as supplemental grants for disaster recovery to rebuild the affected areas and bring crucial seed money to start the recovery process. Since it can fund a broader range of recovery activities than most other programs, DRI helps communities and neighborhoods that otherwise might not recover due to limited resources. DRI supplements disaster programs of the Federal Emergency Management Agency, the Small Business Administration, and the U.S. Army Corps of Engineers.
- **Type of Assistance:** HUD generally awards noncompetitive grants by a formula that considers disaster recovery needs not met by other Federal disaster assistance programs.
- **Eligible Grantees:** DRI funds go to States and local governments in places that have been designated by the President of the United States as disaster areas. Some supplemental appropriations may restrict funding solely to States. These communities must have significant unmet recovery needs and the capacity to carry out a disaster recovery program (usually these are governments that already receive HOME or Community Development Block Grant allocations).
- **Eligible Customers:** DRI primarily benefits low-income residents in and around communities that have experienced a natural disaster. Grantees must award at least half of DRI funds for activities that benefit low-and moderate-income persons. These can be either activities in which the majority of people who benefit have low or moderate incomes or activities that benefit an area in which at least 51 percent of the residents are of low- and moderate-income.



- **Eligible Activities:** Grantees may use DRI funds for recovery efforts involving housing, economic development, infrastructure and prevention of further damage, if such use does not duplicate funding available from the Federal Emergency Management Agency, the Small Business Administration, and the U.S. Army Corps of Engineers.

Examples of these activities include:

- (1) Buying damaged properties in a flood plain and relocating them to safer areas;
  - (2) Relocation payments for people and businesses displaced by the disaster;
  - (3) Debris removal;
  - (4) Rehabilitation of homes and buildings damaged by the disaster;
  - (5) Buying, constructing, or rehabilitating public facilities such as water and sewer systems, streets, neighborhood centers, and government buildings;
  - (6) Code enforcement;
  - (7) Homeownership activities such as down payment assistance, interest rate subsidies and loan guarantees;
  - (8) Public services (generally limited to no more than 25 percent of the grant);
  - (9) Energy conservation activities;
  - (10) Helping businesses create jobs; and
  - (11) Planning and administration costs (limited to no more than 20 percent of the grant).
- **Application:** HUD notifies eligible governments, which must then develop and submit an Action Plan for Disaster Recovery before receiving DRI grants. The Action Plan must describe the needs, strategies, and projected uses of the Disaster Recovery funds.

**INDIANA HOUSING FINANCE AUTHORITY (IHFA)** is the state agency in Indiana that administers HUD programs. As a consequence of the three significant flooding events in Indiana during 2002 and 2003, IHFA introduced the “Voluntary Acquisition/Demolition program” to acquire homes in the areas that were impacted by Presidentially declared flood disasters. These grants are awarded on a competitive basis to acquire substantially damaged, destroyed or floodway residences damaged by flooding which resulted in a presidential disaster declaration.

The awards are up to \$500,000 per community per award cycle on a 90/10 match basis. However, IHFA only has approx \$5 million dollars annually to fund all of their grants (Main Street, Shelters to Homes, etc). The Acquisition/demolition projects compete with all of the programs for these dollars.

- **U.S. Department of Commerce**
  - **Function:** Economic Development Administration -- Title IX Economic Adjustment Assistance Program Funding for planning and construction of public facilities and business development. Title III to respond to developmental opportunities in distressed areas.
- **National Oceanic and Atmospheric Administration**
  - **Function:** Coastal Zone Management, Flood observing and warning system, and Habitat Conservation -- provides statistical information for the identification of hazards and vulnerability of communities to those hazards. This information is vital to identifying mitigation projects before, during and after a disaster.
- **U.S. Geological Survey**
  - **Function:** The U.S. Geological Survey (USGS) is a primary source of earthquake information, mineral data, energy sources, satellite imagery, and high-quality maps and maintains readily accessible data bases on surface and ground waters and water quality.

In Indiana, the USGS has participated in studies that address the availability of ground water for public supplies, agriculture, and industry; locations and quality of mineral resources; flood-risk issues associated with land-use decisions; the effect of water shortages and drought; sources and amounts of sediments that flow in rivers and streams; rates at which selected lakes are being filled by sediments; amounts of pesticides and other chemicals that are reaching water supplies; and the extent of ground-water flow systems and the effects of those systems on pollutant migration and Indiana water supplies.

USGS has undertaken studies of the White River, groundwater aquifers, biological parks, beaches and savannas, Southern Lake Michigan beach and wetland areas, earthquake zones, and topographic mapping.

In response to the water-information needs of the individuals and agencies required to make important economic, environmental, and regulatory decisions, the USGS has been developing a long-term base of water-resources data in Indiana

The USGS provides maps, reports, and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, biological, and land resources. We help find the natural resources needed to build tomorrow and supply the scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by natural and human activities.

For earthquake data, contact the U.S. Geological Survey Center for Earthquake Research and Information (901) 678-2007 at the University of Memphis, Memphis, Tennessee 38152.

- **Resources for Mitigation:** Reduces, abates and mitigates the potential loss of life and property as a result of an earthquake. Through public awareness, development of risk assessment studies and implementation of mitigation measures to prevent or reduce loss from earthquakes. Also funds studies by colleges, universities and organizations to provide data land use planning-engineering design and emergency preparedness.

Monitor rivers and lakes through a series of gages to provide flood warning and flood reduction planning.

- **Natural Resources Conservation Service (NRCS)**

- **Function:** Provide technical and financial assistance in planning and executing works of improvements to protect develop and use land and water resources in small watersheds. Assistance is provided in the form of project grants and advisory and counseling services.
- **Resources for Mitigation:** Provide technical and financial assistance in planning and executing works of improvements to protect, develop and use land and water resources in small watersheds. Assistance is provided in the form of project grants and advisory and counseling services. Protect topsoil resources from erosion by water, wind and over us. Prevention and reduction of rural flooding. Provide water quality improvements and drought management for agricultural and rural communities. However, funding is too limited and inconsistent to seriously consider this as a day to day tool for mitigation.

- **Federal Highway Administration**

- **Function:** Develop and implement design standards for the construction of new highways.
- **Resources for Mitigation:** Provides funding and grants for the construction and repair and restoration of Federal-aid roads that have been damaged as the result of a catastrophic natural disaster.

- **Central United States Earthquake Consortium**

- **Function:** The Central U.S. Earthquake Consortium is a partnership of the federal government and the seven states most affected by an earthquake in the New Madrid Seismic Zone – Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee. Established in 1983 with funding support from the Federal Emergency Management Agency, CUSEC's primary mission is,"... the reduction of deaths, injuries, property damage and economic losses resulting from earthquakes in the Central United States."

## 2.4 Agency Coordination by Environmental Issue

The following environmental issues need to be considered with every hazard mitigation grant project. The answers are eventually entered into FEMA's NEMIS database system. Each issue must fit into the following categories:

- Not in the project area.
- In project area – effect unknown.
- In the project area with no effect.
- Adverse effect.
- Presence in area undetermined.

Table 2-3 Agency Coordination by Environmental Issue	
Issue	Consult with:
<b>Aquatic and Terrestrial Biotic Resources</b>	<b>DNR</b> Division of Fish & Wildlife (317) 233-4579 <b>U.S. Fish &amp; Wildlife Service</b> Supervisor Bloomington Field Office (812) 334-4261 x217
<b>Archaeological or Cultural Resources</b>	<b>Local Historic Society</b> <b>State Historic Preservation Office</b> (317) 232-4020
<b>Coastal Zone Management &amp; Coastal Barriers</b>	<b>DNR</b> Water Division, Coastal Coordinator (317) 232-4160 <b>U.S. Fish &amp; Wildlife Service</b> Supervisor Bloomington Field Office (812) 334-4261 x217
<b>Designated Floodplain/Floodway</b>	<b>Local floodplain administrator</b> <b>DNR</b> Division of Water, Floodplain Mgmt. (317) 232-4160 <b>FEMA, Region V, Mitigation Division</b> NFIP specialist – (800) 621-FEMA Floodplain specialist – (800) 621-FEMA
<b>Drainage</b> <b>(Culvert upgrade)</b> <b>(Relocation of critical facilities)</b>	<b>Indiana Dept. of Transportation</b> (317) 232-5546 <b>FEMA, Region V, Mitigation Division</b> NFIP specialist – (800) 621-FEMA Floodplain specialist – (800) 621-FEMA
<b>State or National Forests</b> <b>Hoosier National Forest</b>	<b>U.S. Forest Service</b> Hoosier National Forest Supervisor Brownsville Ranger District -- (812) 275-5987

Issue	Consult with:		
<b>Hazardous Materials</b>	<b>Indiana Dept. of Emergency Mgmt,</b> Environmental Response (317) 308-3049 <b>EPA – Region V</b> (312) 886-0211		
<b>Historic Structures</b>	<b>State Historic Preservation Officer</b> (317) 232-1646 <b>Local historical society</b>		
<b>Hydrology/Hydraulics</b>	<b>DNR</b> Division of Water (317) 232-4160 <b>FEMA, Region V, Mitigation Division</b> NFIP specialist – (800) 621-FEMA Floodplain specialist – (800) 621-FEMA USACE *		
	<b>Permit Evaluation A</b> Regulatory Office <b>Detroit District</b> (313) 226-6828	North Section (Indiana) Regulatory Branch <b>Louisville District</b> (502) 582-5718	Calumet Office (219) 923-1763 <b>Chicago District</b> (312) 886-8451
	<b>NRCS</b> State Conservationist (317) 290-3200		
<b>Land Use/Development Patterns</b>	<b>Dept. of Commerce</b> Community Development (317) 232-8908 <b>Regional Planning Commissions</b>		
<b>Local Economy/Community Services</b>	<b>Dept. of Commerce</b> Community Development (317) 232-8908 <b>Regional Planning Commissions</b>		
<b>Low Income or Minority Populations</b>	<b>Dept. of Commerce</b> Community Development– (317) 232-8908 <b>HUD</b> Community Planning & Development Representative (317) 226-6303		
<b>Prime Farmland</b>	<b>State Dept. of Agriculture</b> Rural Development Council (317) 232-8765 <b>NRCS</b> State Conservationist (317) 290-3200		
	<b>Indiana Geological Survey</b>		

Issue	Consult with:		
<b>Slopes &amp; Soil</b>	Environmental Geology (812) 855-7428 <b>USGS</b> State Representative (317) 290-3333 <b>NRCS</b> State Conservationist (317) 290-3200		
<b>Special Status Natural Areas</b>	<b>DNR</b> Div. of Nature Preserves (317) 232-4052 <b>USFWS</b> Supervisor Bloomington Field Office (812) 334-4261 x217		
<b>Threatened/Endangered Species</b>	<b>DNR, Division of Fish &amp; Wildlife</b> DNR, Div. of Fish & Wildlife (317) 232-8160 <b>USFWS</b> Supervisor Bloomington Field Office (812) 334-4261 x217		
<b>Water Quality</b>	<b>Dept. of Environmental Management</b> Water Assessment Branch (317) 308-3235 <b>USACE*</b>		
	<b>Permit Evaluation A</b> Regulatory Office <b>Detroit District</b> (313) 226-6828	North Section (Indiana) Regulatory Branch <b>Louisville District</b> (502) 582-5718	Calumet Office (219) 923-1763 <b>Chicago District</b> (312) 886-8451
	<b>EPA – Region V</b> (312) 886-0211		
	<b>DNR</b> Division of Water (317) 232-4020 <b>USACE **</b>		

Issue	Consult with:		
	<b>Permit Evaluation A</b> Regulatory Office <b>Detroit District</b> (313) 226-6828	North Section (Indiana) Regulatory Branch <b>Louisville District</b> (502) 582-5718	Calumet Office (219) 923-1763 <b>Chicago District</b> (312) 886-8451

\*\* Indiana Counties in USACE Districts

- Detroit District entire counties: De Kalb, Elkhart, Jasper, La Grange, Lake, La Porte, Newton, Porter, St. Joseph, Steuben.
- Detroit District partial counties: Adams, Allen, Benton, Kosciusko, Marshall, Noble, Pulaski, Starke, Wells, White.
- All counties in the Wabash Watershed and south are within the jurisdiction of the Louisville District.
- Newton and Lake Michigan Watersheds are within the jurisdiction of the Calumet Office of the Chicago District.

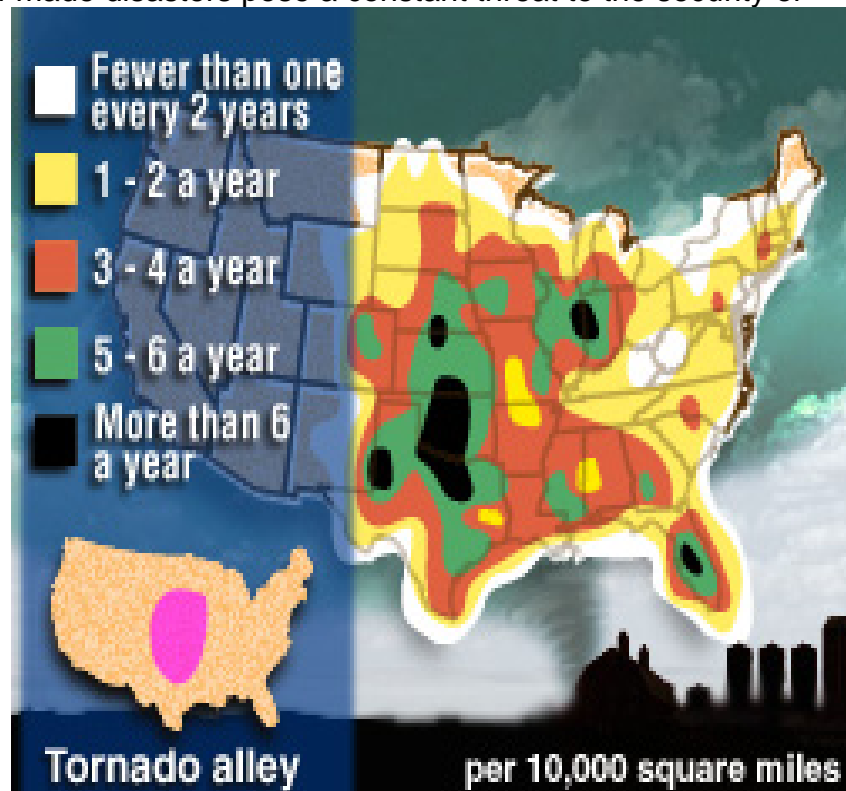
### 3.0 RISK ASSESSMENT

#### 3.1 Identifying Hazards

Both natural and man-made disasters pose a constant threat to the security of the people and property of the State of Indiana.

Due to the idiosyncrasies in Indiana's geography, geology and meteorology the State is at risk for earthquakes, floods, tornadoes/high winds, severe winter storms, and droughts/extreme heat. Other natural hazards, such as subsidence, landslide and wildfire are rare or localized that the risk to the state as a whole is difficult to assess.

Furthermore, according to the USGS website and the Indiana Department of Natural Resources website, there have been no documented subsidences in developed areas of the state. Most of the underground coal mines and the karst topography in the state that would cause these subsidence events are located in rural farming areas. This may change as the coal mines are reclaimed and development pressures force the development of these areas. Of the additional natural hazards such as hail which is associated with tornadic type storms, expansive soils which have been identified by the Indiana Geological Survey, but have not produced significant losses in any community, the state has not addressed these because their resulting losses are



1. not tracked
2. never identified by a local as a significant risk



3. no technical feasible way to eliminate the risk to that which is at greatest risk

Indiana is also at risk for some man-made hazards. Often, these man-made hazards occur as a result of the population's quest to control natural resources: i.e. Levees built to protect agricultural land, which due to development now stand between residential or commercial development and floodwaters. Dams to preserve and provide water to the state's communities or to prevent its rivers from flooding downstream and/or means of transporting themselves and/or their goods throughout the state and across the country are the states most documented man-made disaster. Failure of these dams can destroy a community or its resources. Most of the time, these natural and man-made hazards create only temporary inconveniences to the lives of the citizenry. However, all hazards have the potential to destroy people's homes, communities, economy and lives. The New Madrid earthquakes of 1811 and 1812, the state-wide floods of 1913, 1937, 1964 and 1990, and the tornado outbreaks of 1925, 1965, 1974, and 1982 are only a few examples of the state's vulnerability to natural hazards. This plan will focus on the hazards that pose the greatest risk to State of Indiana and its citizens. The most threatening hazards identified for the State of Indiana are flood, tornado/straight line winds, winter storm, earthquake and man-made disasters.

The state has experienced eighteen declared disasters between May 1990 and September 2004. These disasters caused tremendous economic losses and astronomical recovery costs to be incurred by individuals and all levels of government. This large number of events in such a short period of time is unparalleled in Indiana's history and has generated intense interest in mitigation and preparedness planning at all levels of government within the state.

**The Indiana State Hazard Mitigation Council (ISHMC) is pursuing the following steps to identify hazards that may affect the state:**

- Review of past State and Federal disaster declarations.
- Review of current Flood Insurance Rate Maps.
- Review of available local mitigation plans and hazard analysis documentation. (Note: All 92 counties have begun risk assessments and are on file with IDHS's Preparedness Officer Carlos Garcia. (Note: *The Mitigation Division has acquired an on-line planning system which will allow the state to directly access the local risk assessments into future state mitigation plans.*)
- The use of HAZUS-MH to assess the counties vulnerability for earthquake for this draft and plan to include flooding models in subsequent plans. Currently the local data is default data provided by the developers, however the state on trial models has found that the assessment improves

with the addition of better local and state data and is working to identify and the needed data.

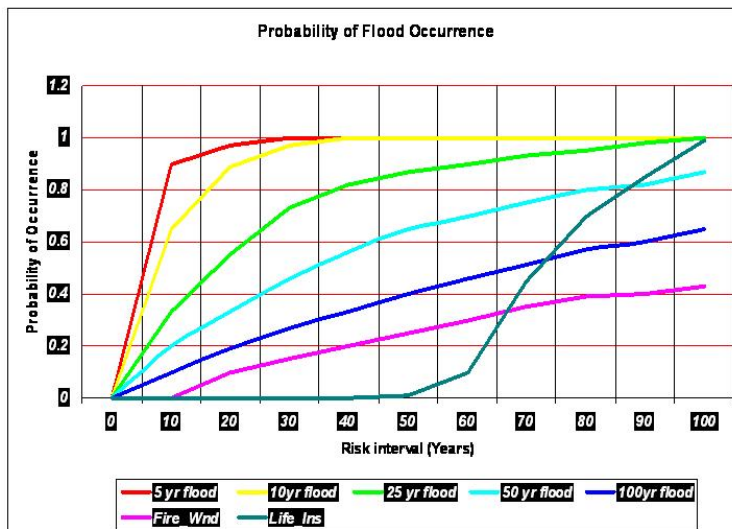
- Review of risk assessment information from various state universities, state agencies, the National Weather Service statistical information, and private contractors.
- Review of information provided by recent geological studies that were conducted as a cooperative effort between IDHS and the Indiana Geological Survey.

As result, IDHS and the ISHMC determined that the state mitigation plan needed to address the risks associated with the following hazards:

- ***Flooding/Dam and Levee Safety***
- ***Tornadoes/Straight-Line Winds***
- ***Earthquakes***
- ***Winter Storms***
- ***Man-made events (IDHS Mitigation will address this issue briefly, but will mainly reference Indiana's Comprehensive Emergency Management Plan and IDHS Homeland Security Division).***

**Flooding** is the most widespread and significant natural hazard in Indiana and throughout the United States. Major flooding occurs within the state almost every year, and it is not unusual for several floods to occur in a single year.

Stream and lake flooding hazards typically result from excess precipitation run off, excess sewer and local drainage channel backwater, deposition of materials or debris in stream channels during flood events, rise of ground water coincident with



The probability of collecting on a flood insurance policy in a 5, 10, 25, 50 or 100 year flood zone compared to collecting on common insurance policies.

increased stream flow, and other problems. The first type of stream or lake flooding that occurs in Indiana is flash flooding. This type of flood occurs in all areas of the state. They can happen at any time of the year, but happen most frequently in the spring and summer months. The second type of stream flood event that occurs in Indiana is river basin or riverine flooding. This flooding is most common during winter and early spring. It usually takes place along Indiana's major streams and rivers, particularly the Ohio, Wabash, Missisnawa, Kankakee and White. This type of flooding has often caused serious damage in many Indiana counties. Lake flooding that affects Indiana is a more type of gradual flooding. This type of flooding affects the city of LaPorte (Pine Lake) on a somewhat regular basis. Pine Lake is a closed-basin, glacial lake with no natural outlet. This flooding is caused by a rise in the area's ground water. The increased lake level has repetitively damaged several lakeshore homes located in the floodplain.

**Dam and Levee Safety** is an issue of growing national, regional and State importance. Dams are inherently hazardous structures because of energy that can be released by elevated/stored water. Many dams and levees in the State have deficiencies that will result in an emergency situation leading to a possible breach failure during an unusual loading condition such as a substantial rainfall event.

If dams or levees fail issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (of concern would be transportation routes and utility lines required to maintain or protect life), loss of

resource purpose and benefits, and environmental damage. Further, the threat of dam or levee failure requires substantial commitment of time, personnel, and resources.

Since dams and levees deteriorate with age, minor issues become larger compounding problems and the risk of failure increases. Further, the downstream areas become more populated and developed risking more lives and property, and escalating mitigation and rehabilitation costs. Like many critical infrastructure projects, dams and levees are also potential terrorist targets.

Floodplain areas around lakes and along streams, and areas thought to be protected from flood events, may also experience dramatic inundation if levees or earthen berms fail during the stress of flood events. There are a few levee systems in the State that are true flood protection structures. Many levees, however, present a significant hazard because their presence seems to provide a false sense of security. Many of them were built only for small flooding agricultural protection, in areas that have since had residential development.

Examples of media attention regarding levee emergencies that came to recent memory include:

- Flood response sandbagging of levees during flooding in Fort Wayne.
- The Indianapolis water canal levees, an uprooted tree breached the levee and downtown Indianapolis had its water supply threatened.
- A 1990, 600 foot long levee failure that took out a county road and the town of Petersburg's water supply along the White River.
- Another levee failure in 1996 destroyed a mobile home and again threatened the water supply of Petersburg.
- The Hazelton levee emergency in 1991 (and again in January 2005), White River threatened several dozen homes, a state and federal response and a sand bagging averted disaster.
- The Marion and Johnstown Indiana levee breach, August 1998, along the Mississinewa River.
- The Elnora levee along White River in, Daviess County, near breaches during several flooding events leads to its recent complete reconstruction.
- The Wicker Park Levee, along the Little Calumet River in Lake County, 1990, caused flooding of 270 houses and the complete reconstruction of the levee.
- The Sumava Resorts levees on the Kankakee River, Newton County, on-going issue any time this river raises.
- The Ohio River levees, in Cannelton and Tell City, during an event in 1997, were examples of actual flood control levees that have not been maintained properly and were exhibiting extreme stress in a flood which was much lower than the design level.

The failure of a dam or an important component of a dam may cause substantial flood damage. Dams are classified by the Hazard they present to downstream property and life, if they were to fail (the classification does not indicate the state of disrepair or the likelihood of failure).

- *High Hazard Dam* - where failure may cause loss of life, serious damage to homes, industrial and commercial buildings, important public utilities, main highway, and railroads.
- *Significant Hazard Dam* - in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, minor railroads, or cause interruption or use of relatively important public utilities.
- *Low Hazard Dam* - in rural or agricultural area where failure may damage farm buildings, agricultural land, or township and county roads.

Depending on the size of an impoundment and the severity of a dam failure, the flood inundation area may be substantially deeper and larger than areas identified as 100-year flood plains for insurance purposes. The lack of the flood insurance flood plain maps to account for inundation due to dam failure is a problem common to all 75,000 plus regulated dams in the United States.

In Indiana the Department of Natural Resources (IDNR) Dam and Levee Safety Branch regulates about 1100 dams in the state, about 250 of which are high hazard dams and about 280 of which are significant hazard dams. Most of these dams are not state owned. As the dam building era was more than 40 years ago, the inventory of dams is greatly aging and dams are deteriorating. Component and total failures of dams are becoming more common in the State. Additionally, with time residential development continues to increase near water resource features, thus increasing the number of individuals and property at risk due to dam failures. This development also is causing the hazard classification of existing dams to creep up. Dams that were designed and built to function as low hazard structures, because of uncontrolled downstream development now function as high hazard dams.

Some examples of media and/ or state attention regarding dam emergencies include:

- Lake McCoy Dam -- Decatur County, a high hazard dam with repeated failures.
- Beanblossom Dam
- Raysville Dam -- Henry County, a high hazard dam with extreme neglect and deterioration.
- Sylvan Lake Dam -- Noble County, a high hazard dam with a continuing history of deficiencies and component failures.
- Scottsburg water supply reservoir -- a high hazard dam, after 12 inches of rain, the concrete emergency spillway was totally destroyed, the

earthen dam embankment was sand bagged and complete disaster narrowly averted.

- Hamilton Lake -- Stueben County, a high hazard dam, 8" of rainfall in about 12 hours, the dam overtopped, quick action by DNR, INDOT and IDHS averted failure of the highway that had become a temporary dam.
- Goshen pond dam
- Grandview dam -- Bartholomew County, a 50 + foot high hazard dam where the embankment cracked down the centerline resulting a failure of the slope. Quick action by the owner's engineer and contractor saved the stabilized the dam.
- Lake Schaffer -- Bartholomew County, a significant hazard dam with a seriously inadequate spillway has nearly overtopped several times in the last 10 years. The lake level has been lowered to reduce the risk of an overtopping failure.
- Hurshtown reservoir -- Allen County, embankment slope instability problems have resulted in several instances of immediate attention and concern on this off-channel high hazard reservoir.
- Centre Grove Dam -- Johnson County, although this high hazard dam had been reconstructed the failure of the principal spillway pipe threatened the structure and required an emergency drawdown of the lake.
- Wagnor Youth Camp Dam -- Grant County, failure of the concrete spillway on this high hazard dam resulted in emergency repairs.
- Brush Creek Dam -- Jennings County, the development of a sinkhole near the toe of slope on this high hazard dam resulted in the lowering of the lake and implementing a detailed monitoring program and developing an extensive reconstruction plan.
- Lake Salinda Dam -- Washington County, the failure of a portion of the concrete ogee spillway resulted in an unscheduled response by state officials and the governor. A temporary emergency measure of placing fill downstream of the failed spillway and lowering of a water supply lake was required.

Even the best of the best dams can have problems. Two federal dams, which are examples of conservatively designed and built structures, have recently experienced substantial problems.

- Patoka Reservoir -- sinkholes formed with underground voids in the emergency spillway, this resulted in a multi million dollar repair.
- Mississenewa Reservoir -- piping under the embankment is causing displacement of embankment fill material and significant settlement. This lake level has been lowered for at least 3 yrs, and repairs are estimated at \$55 million for a cutoff wall through the embankment into bedrock.

At the present time, the State of Indiana does not have all the data needed to assist in the prediction of the probability of dam failure. Such data will

be made available upon completion of the inundation mapping for the dams throughout Indiana. (See project 10 in Section 4 of this document.)

**Tornadoes** also pose a great risk to the State of Indiana and its citizens. Tornadoes occur at any time during the day or night. They can also happen during any month of the year. Tornadoes' sheer unpredictability make them one of Indiana's most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region's developed and populated areas. Current estimates place the maximum velocity (combination of ground speed, wind speed and upper winds) at about 300 mph, but higher and lower values can occur. A wind velocity of 200 mph will result in a wind pressure of 102.4 pounds per square foot of surface area, a load that exceeds the tolerance limits of most buildings. When these two factors are taken into consideration, it is easy to see why these weather events can be so devastating for the communities they hit.

Another related Hazard associated with strong storms is **straight-line winds**, which can occur anywhere in the state. Severe wind gusts have caused considerable damage in the State of Indiana. They tend to occur during thunderstorms and in conjunction with super cells from which tornadoes develop. In recent years there have been events associated with these winds. While there is no formal means for tracking these events they are considered to be more common during thunderstorms than tornadoes in the damage they cause. Damage from this type of hazard tends to be more widespread and impact greater numbers of people. Because of the potential scope of this type of hazard, mitigation projects provide significant benefit in protecting lives and property for the dollars spent. These efforts are also multi-purpose, providing protection during earthquakes and tornadoes, as well as straight-line winds. For example, a common mitigation measure is to retrofit buildings to strengthen the integrity of the structure. Because these damages are normally included with tornado declarations or are collected by private insurance carriers, we will not discuss these separately from tornadoes.

Indiana has experienced many **earthquakes** within or very near to its borders. In the winter of 1811-12, the Great New Madrid Earthquakes jolted Indiana. This series of earthquakes was the largest reported in the Continental United States. The largest shocks were estimated to exceed magnitude 8.0. The power of these earthquakes caused the Mississippi River to flow backwards and change course and church bells were rung in Boston. The New Madrid Seismic Zone extends from Northwest Arkansas to Southwestern Indiana, and over 200 small earthquakes are reported every year.

The New Madrid Seismic Zone is not the only seismic area of concern to Indiana. Extending from Western Kentucky, up the Indiana and Illinois border is the Wabash Valley Seismic Zone. The Wabash Valley Seismic Zone has produced moderate earthquakes in the magnitude 5.0 range and researchers have found

evidence of larger earthquakes in the magnitude 7.0 range along the Wabash River. Moderate earthquakes have occurred in recent history in 1909, 1968, 1987 and 2002. The Wabash Valley Seismic Zone is of greater concern for the Cities of Evansville, Vincennes, Terre Haute and Indianapolis.

A third seismically active area of concern to Eastern Indiana is the Western Ohio Seismic Zone near Shelby and Auglaize County Ohio. This seismic zone has had a history of producing moderate and damaging earthquakes. Geologists believe that a larger and more catastrophic earthquake could occur in this region. Cities in Eastern Indiana such as Ft. Wayne and Richmond would be affected by an event in Western Ohio. It is not a matter of if an earthquake will happen, but when. Most of the larger earthquakes that have occurred happened before Indiana had a complex infrastructure such as transportation, utilities, communications, population and economic base. Due to the infrequency of large earthquakes, these elements have not been built to withstand a catastrophic earthquake. Because of this, Indiana could expect a long and costly recovery process after an event like this.

The fourth major natural-hazard event that affects all of Indiana is **winter storms**. Indiana has repeatedly been struck by strong winter storms called blizzards. Blizzards occur when heavy snowfall is accompanied by strong winds. These conditions not only can cause power outages, loss of communication, but also make transportation of any form impossible. The “white out” conditions make visibility zero, but the resulting disorientation makes even travel by foot dangerous if not deadly. The most damaging winter storms in Indiana occur when moisture-laden gulf air converges with the northern jet stream causing strong winds and precipitation. This precipitation takes the form of freezing rain, which coats the power and communication lines and trees with heavy ice. The winds will then cause the overburdened limbs and cables to snap leaving large sectors of the population without power, heat, or communication.

Indiana must also consider the effects of **man-made hazards** on the citizens of Indiana. During the Cold War, the focus of emergency management planning was on responding to and recovering from a nuclear attack. In the 1990's this focus shifted to primarily address natural disasters. The events of September 11, 2001 in New York, and the hazardous material train derailment and fire in Baltimore Maryland, show the need to incorporate planning for these types of events into Indiana's All Hazard Mitigation Plan. In this plan, man-made hazards are those associated with technological hazards and terrorism. Technological hazards are those that refer to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. Terrorism refers to intentional, criminal, malicious acts. The CFR defines terrorism in the following manner "...the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, to intimidate or coerce a government, the civilian population,



or any segment thereof, in furtherance of political or social objectives.” (28 CFR, Section 0.85)

Extreme temperatures and drought could pose a slight threat to Indiana. Indiana has addressed these issues in the Comprehensive Emergency Management Plan-Drought annex. IDHS has chosen not to address these issues in their All Hazard Mitigation Plan due to the minimal occurrences that would be expected.

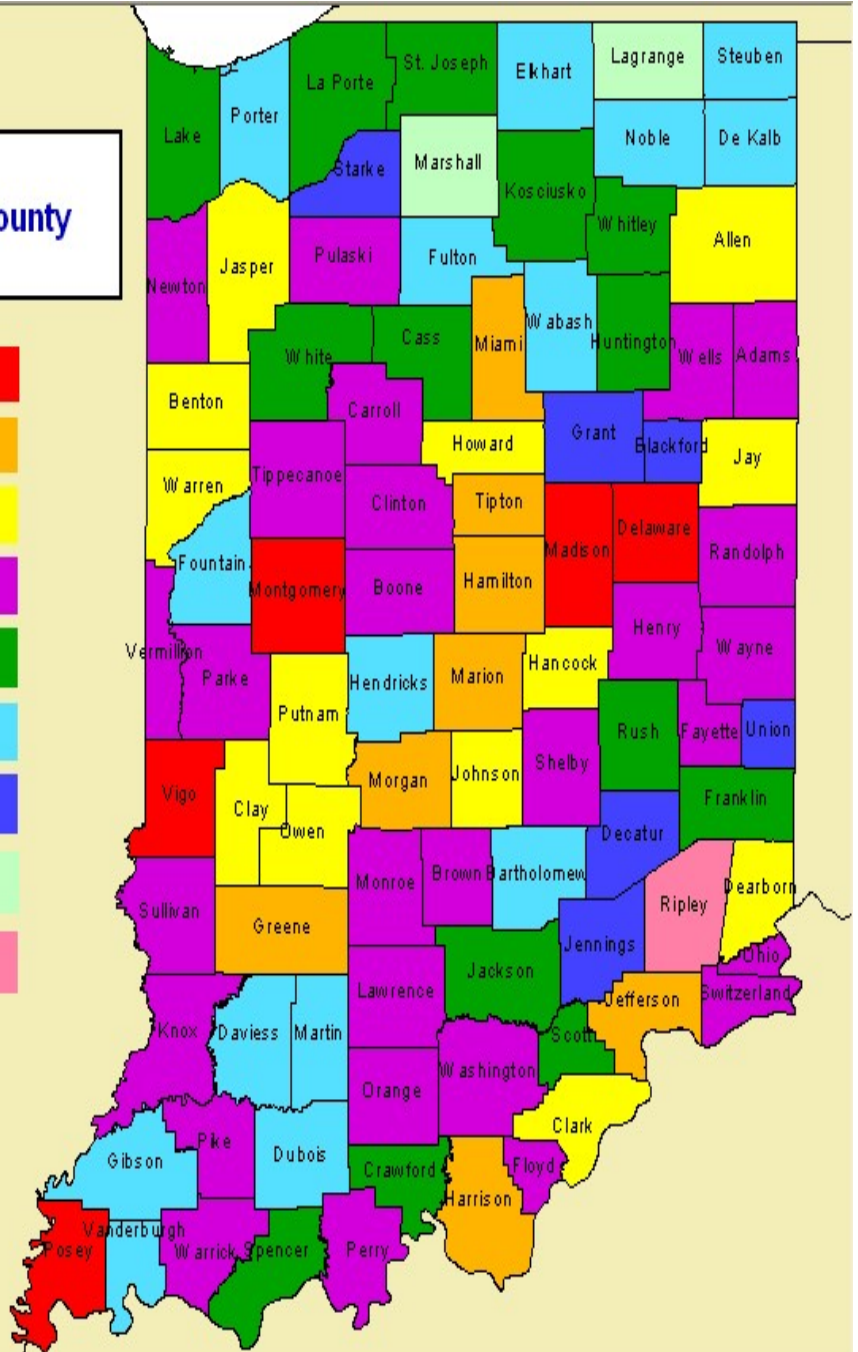
Increased population density with its elimination of unpaved earth and natural ground cover has also increased people’s exposure and vulnerability to many hazards. Simultaneously the state’s citizens have demonstrated a significant increased interest in protecting their communities from the devastating consequences of unmitigated natural hazards. As a result Indiana’s mitigation strategy is designed to reduce or eliminate the risk from natural and man-made hazards without diminishing the quality of life of its citizens or their communities. Removing homes or restricting property development in the floodway or floodway fringe, thereby creating in perpetuity, green spaces, parks, golf courses and other unobstructed land are prime examples of the state’s current mitigation efforts.

The chart and the map below show the type, location, and frequency of disasters in the 1990’s. Most of the declared disasters are associated with flooding; however, stream and lake flooding typically does not occur without storms, and these storms usually carry strong winds, and sometimes tornadoes. Flooding from dam or levee failures can also be associated with a storm event. In the case of dams, however, flooding may occur through a sunny day failure of the dam or a component after small problems left unattended have grown into substantial problems. Flooding from a dam may also occur as a result of a terrorist incident.

Federally Declared Disasters 1990-2004				
DISASTER #	DATE	TYPE OF DISASTER	# OF COUNTIES	EXPENDITURE
869	06/04/90	FLOODING	20	\$10,980,692.00
885	12/16/90	FLOODING	1	\$2,871,285.00
891	01/05/91	FLOODING	67	\$6,802,309.00
899	03/29/91	ICE STORM	21	\$19,979,257.00
953	08/17/92	FLOODING	6	\$2,725,548.00
962	09/18/92	WINDS, STORM, FLOODING	15	\$5,228,513.00

1002	09/09/93	FLASH FLOODING	6	\$783,237.00
1109	04/02/96	WINTER STORM	35	\$4,130,652.00
1125	07/03/96	SPRING STORMS, FLOODING	27	\$7,486,770.00
1165	03/06/97	OHIO RIVER FLOOD	13	\$4,412,066.00
1217	05/08/98	WINTER STORM	8	\$5,585,824.00
1234	07/22/98	STORMS, TORNADOES, FLOODING	23	\$12,908,434.99
3135	01/15/99	WINTER STORM	59	\$12,297,219.61
3162	01/24/01	WINTER STORMS	19	\$4,797,468.31
1418	06/13/02	STORMS, TORNADOES, FLOODING	28	\$8,415,581.61
1433	09/25/02	STORMS, TORNADOES	32	\$6,808,932.89
1476	07/11/03	STORMS, TORNADOES, FLOODING	42	\$22,905,780.40
1487	09/05/03	STORMS, TORNADOES, FLOODING	21	\$8,228,038.84
1520	06/29/04	STORMS, TORNADOES, FLOODING	68	ONGOING
1542	09/01/04	STORMS AND TORNADOES	20	ONGOING
1573	01/21/05	ICE STORM AND FLOODING	62	ONGOING
		TOTAL	511	\$138,932,028.

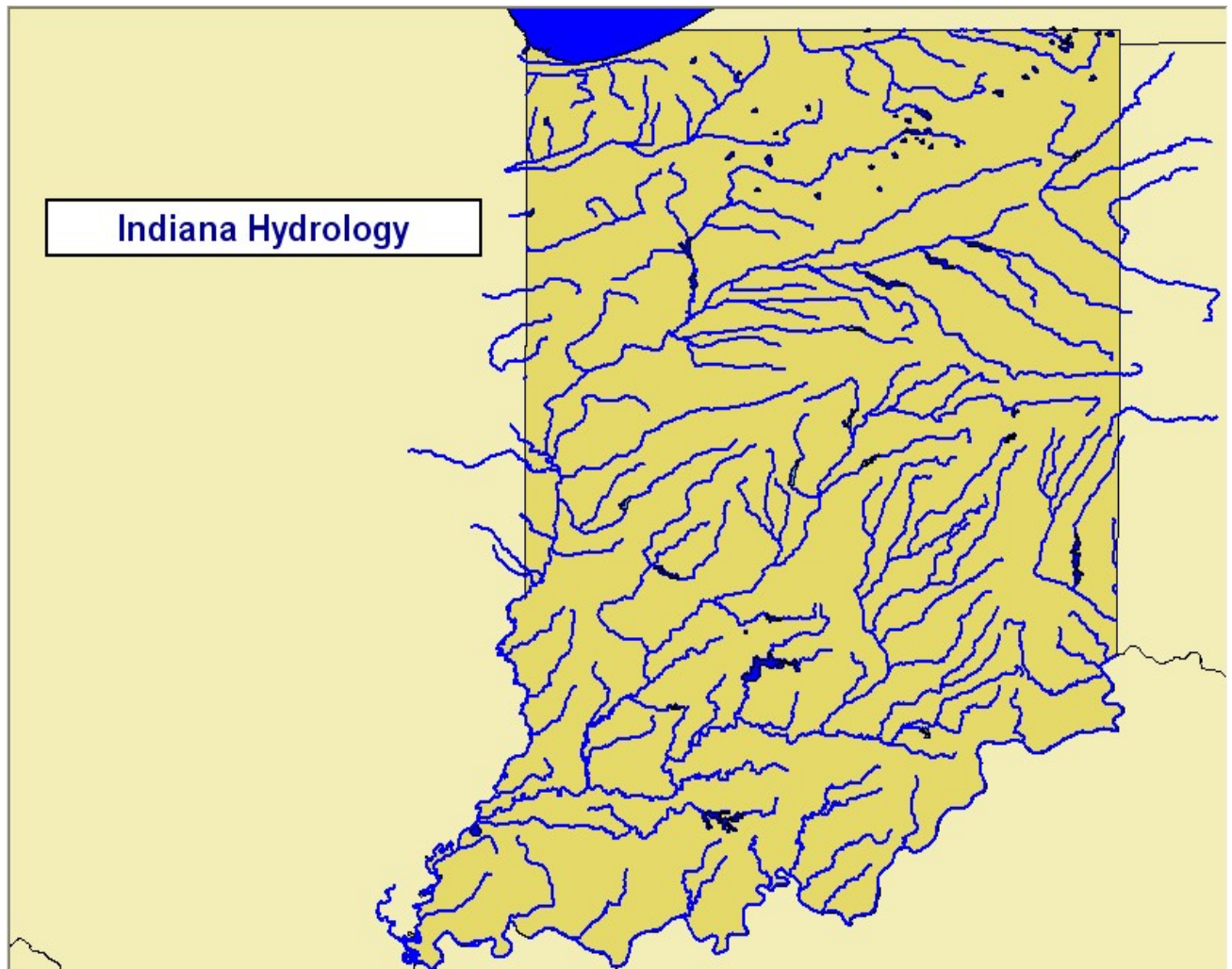
January 1990 - June 2004





### 3.2 PROFILING HAZARDS

This section provides information on historical hazard occurrences for the State of Indiana in regards to the natural hazards identified in the risks profiled in the previous section – Flooding, Tornadoes, Straight-Line Winds, Earthquake, and Winter Storms.



#### **Flood History**

Flooding is a recurrent problem in Indiana. Historically, the state has experienced annualized flooding along one or more of its rivers or streams. Its last major disaster declaration for flooding was in the summer of 2003 on the Wild Cat Creek, Maumee, St. Mary's, Wabash, Tippecanoe and White rivers across the state. This disaster affected 42 Counties with a total of 22 million dollars in recovery. (Indiana also received major flood disaster declarations in June of 2002, September 2003, and June 2004). These floods and are typical of flooding



in Indiana and cover nearly all its counties. They are summarized below. These events illustrate that the same areas repeatedly flood and show the need for aggressive mitigation activities within their floodplains. (January 2005 flooding is summarized in Winter Storms Profile)



*March '97 Ohio River Flood*

In fact as this plan was being finalized, the State of Indiana experienced flooding of a magnitude that has not been seen in 90 years. At the height of the flooding, over two-thirds of counties were experiencing flooding. In fact, many of the rivers were experiencing record level flooding. Several levees were breached and more were threatened by river levels that exceeded records set during the statewide flooding of 1913.

### **Flood Vulnerability**

Vulnerability is the susceptibility of population, human services, transportation, other infrastructure and the economy to damage. Vulnerability is essentially the linkage between hazard and loss. It is critical to current and future exposure analysis.

Based upon reported damages from historic floods, the following can be considered vulnerable to current and future damage and loss from flooding:

- Loss of human life.
- Livestock from drowning.
- Furnishings, equipment, personal property and basements.

- Roads and ditch lines from mud and rockslides.
- Roads and bridges due to washout, road surface and road bed failure.
- Rural water supplies (wells, springs and cisterns) due to contamination from surface water entering the supply source.
- Heat, water and electrical sources cut off due to rising water.
- Drainage from catch basins and retention ponds. If they cannot handle the volume of water, they cause back-up flooding.
- Homes are destroyed by deep, fast moving floods.
- Municipal water and sewage treatment plants can become inoperable if levees and retaining walls are overtopped and/or if sediment basins are flooded.
- The supply of raw water from municipal water supply reservoirs and back up water supply reservoirs can be reduced or lost due to the failure of an impounding dam.
- In essential facilities, electrical panels and circuit breakers are often installed on interior walls below the 100-year flood level. This results in loss of power when the water rises to the level of the panels.
- Water can enter otherwise protected facilities through non-flood proofed mechanical and electrical rooms and through conduits.
- Bridges, culverts and stream crossings may be unable to handle the volume, causing backup onto roads and into residential and commercial structures.
- Backup of water can be caused or increased when automobile-bodies, refrigerators and other appliances that have been discarded into streambeds hinder the natural flow of water. Backup also occurs if drainage systems have not been properly maintained.
- Backup water can enter storm sewers and cause flooding in areas not threatened by stream flooding.
- Levees constructed by the Corps of Engineers are sometimes inadequate to hold back the volume of water resulting in the failure of the structure.
- Many developed areas have failed to provide for the excessive run-off caused by concrete and blacktop ground coverage.
- Detention basins, retaining walls and berms are designed to redirect water from vulnerable areas. Flooding often results when these protective measures are not in existence or have not been properly maintained.

INDIANA'S TOP TEN REPETITIVE LOSS COMMUNITIES		
COMMUNITY	# OF PROPERTIES	REPETITIVE LOSSES
City of Fort Wayne	65	142
City of Indianapolis	50	134
Fulton County	33	92
Carroll County	22	56
City of Kokomo	17	46
City of Plymouth	17	44
Allen County	20	43
Vanderburgh County	15	40
Clark County	14	38
Noble County	13	27
<b>TOTALS</b>	<b>266</b>	<b>662</b>

### **Current & Future Exposure**

**Population Exposure** - Due to the many rivers within the state (Ohio, Wabash, White, Maumee, St. Joseph, Tippecanoe, St. Mary, Kankakee, etc.), a large portion of Indiana's geographic area and population is vulnerable to flooding. The southern third of the state is most prone to repeated flooding. Hazards affecting the population result from a variety of flood actions, including:

- Overflow of land areas;
- Temporary backwater effects in smaller streams, sewers and drainage systems;
- Creation of unsanitary conditions;
- Deposition of materials in stream channels during flood recessions; and the rise of ground water coincident with increased stream flow.
- The tragic results of flooding includes the loss of life as well as damage and/or destruction of homes and businesses and their contents, farms and farmland, public sector infrastructure and interruption of the economy. Counties declared disaster areas by the President in 1990, 1991, 1992, 1996 and 1997 and their 1990 census populations are found on the following page.

**Human Services Exposure** - Any human service agency with facilities and equipment in a floodplain is subject to damage and destruction of their facilities, inventory, emergency communications equipment and emergency vehicles during a flood. This would occur just as the agency faced a serious demand for service from patients and clients. **Reference CTASK GIS Assessment of Critical Infrastructure for Indiana Counties**



**Transportation Exposure** - The Interstate Highway System is constructed to elevations that accommodate 100-year flood levels. However, a number of state and county roads, as well as city streets will be under water. As the waters recede the same roads and streets will be covered with debris. Landslides will block many roads. Bridges and culverts might be undercut to the extent of being dangerous or closed. **See CTASC GIS Assessment of Critical Infrastructure for Indiana Counties Appendix I**

**Other Infrastructure Exposure** - Floods can cause damage and destruction to the aboveground system components of all public utilities (water, electric, gas, sewer and telephone). Loss of water supply can result from the lack of electric power to operate the equipment and/or from damage and destruction of aboveground system components, such as water supply dams. The water system can also become contaminated from flood and backwaters.

**Economic Exposure** - The economic consequences of flood damage to individuals and businesses consists of lost wages due to temporarily or permanently closed businesses, destruction and damage to real and personal assets, loss of tax base, recovery costs to individuals, government and businesses and lost investments in destroyed assets.

Future exposure to floods will increase due to increases in population and development in those areas subject to repeated flooding. Mitigation projects and efforts will help reduce this exposure. It cannot be entirely eliminated.

**See CTASC GIS Assessment of Critical Infrastructure for Indiana Counties**

## **Loss Estimation**

### **Loss Potential**

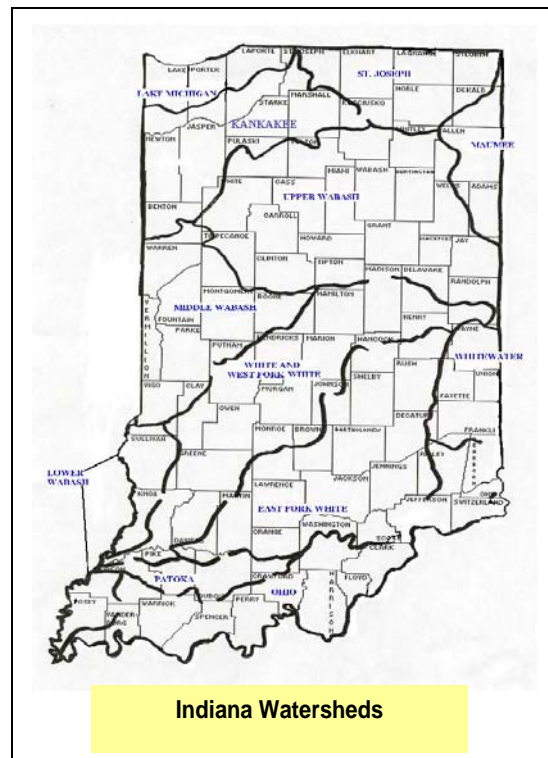
- For many locations across Indiana, the flood of 1913 remains the flood of record. Since then, considerable federal, state and local dollars have been spent to reduce future flood damage. Numerous flood control projects have been completed. In many areas floodplains are strictly controlled and individual property owners have implemented flood protection measures.
- While the flood threat has been reduced in many jurisdictions, particularly in the larger urban areas, it has not been eliminated.
- The August 1992 flood resulted in six counties being declared disaster areas. Estimates of damages were in excess of \$ 2,395,500 for public assistance. No loss of life was attributed to this disaster.
- The September 1992 flood was the second declared flood disaster in the year for many of the damaged counties. The city of Alexandria in Madison County

experienced the most damage. Estimates placed public damages at \$5,375,166. The state and federal preliminary damage assessment estimated that a total of 148 homes were affected with over 81 of those either destroyed or substantially damaged. Franklin County suffered severe damages as a result of the storm. Damage Assessment Teams identified 49 locations where culverts and bridges had been washed out. Several landslides resulted from the intense rainfall and run-off. These slides blocked roads and diverted streams causing significant damage to roads, stream channels and structures located in the path of the water. There were no deaths as a result of this flood.

- Following the flood of 2003, 78 of 92 of Indiana's counties were declared disaster areas. Two people lost their lives as a result of the flooding. Approximately 1700 people were forced from their homes. Substantial damages estimated at over \$13 million were documented from the Wild Cat Creek, Tippecanoe, Maumee, Wabash, White, and St. Mary Rivers as well as numerous creeks and ditch flooding.
- A "no action" response to flooding hazards will result in increased human suffering and property damage. Due to the magnitude of the hazard there must be a continuation of an aggressive program of flood mitigation coordinated with aggressive programs of public information and education, enforcement of floodplain management regulations, and response and recovery programs. A "no action" approach will result in greater repair and replacement expenditures when flooding does occur.

The losses resulting from the floods of 1991, 1992, 1997, 2002, 2003, and 2004 are excellent examples of the frequency of flooding, the risk to people, economic structure, and infrastructure caused by severe flooding in Indiana.

Appendix I includes the hydrology map of each county. The maps represent the current status of Indiana Flood plain maps. A few counties' maps have been converted to digital from paper and some have the Q3 maps. A very select few have new digitally drawn maps, but most have old paper maps. The counties where no form of digital map exists have only major rivers and lakes layered on the county



maps. The Department of Natural Resources retains a copy of all the current existing flood maps for the state and the accompanying Flood Insurance Study.

EXPENDITURES BY FLOOD DISASTER					
DECLARED DISASTER	1234 *	1418	1476	1487	1520
FEDERAL					
Public Assistance	\$4,901,470	\$6,165,581.61	\$9,541,210.36	-	\$7,678,597.90
Individual Assist.	-	\$296,314.90	\$13,364,570.04	\$8,228,038.84	\$1,440,319.87
Mitigation(7.5% of Tot)	(\$735,221)	(\$589,090.70)	(\$1,717,933)	(\$617,103)	(\$683,919)
	-	-	-	-	-
TOTAL	\$4,901,470	\$6,461,897	\$22,905,781	\$8,228,039	\$9,118,918

\*Mitigation dollars for 1234 were 15% of total

### Winter Storm History

Historical weather information indicates that the entire state is at risk from winter storms. During the past ten years throughout the 1990's, all but two counties experienced winter storm disasters and emergencies. And, there are records of blizzards and heavy snows, accompanied by strong winds, as early as 1870. Between 1910 and 1973, the state experienced strong winter storms nine times. Most of these storms affected the northern two thirds of the state. The storms that occurred in 1965 and 1973 were statewide snow emergencies. These storms did not have the economic impact of the 1977 and 1978 blizzards.



The Blizzard of 1978 - Photo of downtown South Bend in January, 1978. 4-6 feet of snow fell in South Bend.

On January 29<sup>th</sup>, 1977, the National Weather Service issued a Blizzard Warning. The storm that followed brought 50mph winds and sub-zero temperatures. The blowing snow buried vehicles and the landscape under 20 foot drifts. The intensity of the storm was heightened by the natural gas shortage the state was experiencing due to the nearly 30 days of sub-zero temperatures. Although the

northern two thirds of the state were hardest hit, deep, drifting snow made travel state-wide difficult, at best. Drifting snow stranded an Amtrak train traveling to Chicago from Florida. Nine people died as a result of the storm.

The month of January 1978 was one continuous snow-storm. As the state would return to normal, another storm moved in depositing another couple of inches of snow. On January 25<sup>th</sup>, the National Weather Service issued a winter storm watch. By early afternoon, the storm was upgraded to a Blizzard Warning. By the time the snow stopped on Friday the 27<sup>th</sup>, the storm had left between 13 - 17 inches of new snow. The storm produced strong winds of 35mph with some gusts up to 75mph. Drifts buried semi trucks on the interstates. For three days, transportation ground to a halt. The cold caused water pipes and water mains to break; the snow made repairs slow and difficult. Manufacturing firms operated with the people who were left stranded at work. Until the roads were opened, food and other necessities were limited to what was on hand. By Saturday most major roads had one- lane open, but traffic was limited to emergency travel only. Fifteen people died in Indiana as a result of the storm. Eighty- five counties were eligible for Federal Assistance for snow removal.

Another type of winter storm, the ice storm, is usually severe and the most common in Indiana. These storms are usually smaller, isolated storms that quickly turn to snow. The worst occur in late fall or early spring. These storms can stop transportation, and can also damage the power and communications infrastructure, if they contain strong winds. On March 12 and 13<sup>th</sup>, 1991, a storm moved across the Northern portion of the state. It started as rain. As the temperature began to drop, the rain turned to snow along the northern edge of the storm. The rain became freezing rain and sleet through the central part of the storm. The storm deposited more than ½ inch of ice on trees, cables, cars, roads, communication towers, etc. Of the 21 hardest hit counties, it was not uncommon for 80-90% of the county to be without power. The loss of power also meant a loss of water in several counties. County and state roads were closed due to downed lines and trees. By April 1, 1991 it was estimated that more than 100,000 homes still did not have power completely restored. The ice storm and the power outages were responsible for six deaths. This disaster was the most costly of Indiana's ten disasters.

On January 6-12, 1996, a major blizzard moved across the Ohio Valley and on to the east-coast. The storms brought snow and winds that caused drifting along the southern third of the state. The strong winds brought down power lines and trees. This was the second major snowstorm to hit the state during the winter of 1995-1996. On average, the southern third of the state has 10 inches of snow. Snow depths, during this storm, ranged from 15-24 inches in that part of the state. The roads in the southern 1/3 of the state were closed intermittently for six days due to drifting snow.

In the pre-dawn hours of March 9, 1998, the beginnings of a winter storm moved into the far northwest counties of Indiana. The storm started as freezing rain, depositing a thick layer of ice on the interstates, roads, power lines and exposed surfaces. The temperatures continued to fall and by afternoon the lake effect snow driven by steady 30 to 40 mph winds with gusts up to 50 mph resulted in total "white out" conditions in the northwest counties. By noon of the 9<sup>th</sup>, widespread power and telephone outages were reported. Interstate Routes 80/94 and 65 were parking lots from the state line to U.S. Highway 30. This was due to the stalled and jack-knifed vehicles. Some drivers refused rescue efforts and spent 24-36 hours in their vehicles with wind chills in the minus 15-degree range. Average accumulations for 3 days totaled 16 to 22 inches of snow, with reports of up to 30 inches in some areas. The wind driven snow produced drifts 15 feet high. For the first time in its history, Northern Indiana Public Service Company (NIPSCO), which provides power to 400,000 customers, lost one third of its customers (138,000) due to downed transmission lines. The lack of telephone communications and non-compatible radio systems made coordination of responding agencies nearly impossible. Red Cross opened 62 shelters to assist stranded travelers and residents who were without power.

Additionally, because of the climate in Indiana and world wide weather events such as El Nino, winter storms have resulted in significant events not only related to the effects of snow and ice. The winter of 2004-2005 developed into one of those seasons.

The winter of 2004-5 had only officially arrived when on December 22-24th the snow began to fall on the Central, Southern and far Northern (bordering Michigan) counties. The southern third of the state received record levels of snowfall exceeding the level that fell during the Blizzard of 1978. Many received nearly three times their annual snowfall during a 48 hour period. This portion of the state has a more temperate climate and does not normally record snow depths over a few inches with annual snow depths less than a 18 inches or less. During a 48-hour period the area received over two feet of snow with 29-39 inches of snowfall in some locations. Because the amounts of snow, the resources of local jurisdictions and INDOT in the area were overwhelmed. The roads and interstates in these areas were impassable due to the amount of snow and the inability to effectively remove snow. Many motorists were trapped in their cars for long periods of time before National Guard Units and local law enforcement officials were able to transport them to shelters. Several livestock barns collapsed under the weight of the snow killing or forcing the destruction of the livestock housed in these facilities. Additionally, several homes and businesses collapsed from the weight of the snow. The state recorded 6 deaths directly related to the storm. Fortunately, the winds were relatively calm and there was little or no ice associated with this storm and the damage to infrastructure and the traveling public was minimized.

As the New Year began, the state experienced spring-like temperatures and melting snow that raised most rivers to near flood stage and saturating the ground. Within days of the melting, a sharp fall in temperature and a band of moisture moved across the north central portion of the state depositing ice between 1-2.5 inches thick on trees and utility lines leaving more than 200,000 customers without power with temperatures dropping into the teens. Delaware County alone cleared nearly 60,000 tons of woody debris and it took over a week for the power to be restored to 90% of those affected.

The lack of power and the dropping temperatures forced the evacuation of over 70 nursing homes, closed schools, closed roads and caused 2 deaths. Initially one hospital was forced to close their emergency room due to the lack of power when back up systems were overwhelmed. Also the cold required the treatment of numbers of persons overcome by carbon dioxide and monoxide due to the use of alternative heating sources and the lack of ventilation.

Just as power was being restored, another warm front moved across the state raising the temperature into the mid 60's. The rain began to fall across the state on already saturated ground while the rivers were already at or near flood stage. With in a few days 6-9 inches of rain fell. Major rivers quickly rose above or near the levels of the summer of 2003 in the north. Levels in the central and southern part of the state exceeded these levels and quickly approached record levels.

The ice and flooding resulted in a major Presidential disaster declaration for 63 counties for individual assistance. Many of these counties have now had 5-6 declarations and one snow emergency in 3 years. This flood will exceed the floods experienced during the winter of 1990-91.

### **Winter Storm Vulnerability**

Most vulnerable to the effects of a winter storm are the economic aspects of a community. This is, for the most part, a type of damage, which is difficult to quantify. These losses are subjective. Industry, retail, trades, etc. are dependent not only on the constant supply of goods, but also on people to build, manufacture, and purchase goods and services. All are dependent upon the transportation and utility systems within the city, county, state, and nation. Some will recover when the people and goods are able to move around, but at increased cost due to overtime, spoilage, and increased material costs. These losses are not losses that are normally considered or funded through government disaster assistance. We can figure the cost of replacing transformers, wire, communication towers, etc. It is more difficult to measure the loss of business revenues due to loss of telephone, communications, or the absence of employees.

## **Current Exposure**

**Population Exposure** - Historical information indicates that the entire state is at risk to winter storms. Persons who are isolated in the best of weather conditions are also the ones in the greatest danger. They are more reliant upon the roads and vehicular travel for access to needed supplies. Lack of communication due to downed phone and power lines, will further isolate and make obtaining assistance more difficult if needed.

**Human Services** - The loss of usual means of transportation to provide emergency services and the dependence upon back up power systems will be the first of many impacts upon the Human Service Agencies. The lack of reliable communications and personnel to staff and provide services paired with increased demand for services they provide may overwhelm smaller agencies and tax many larger agencies to near exhaustion.

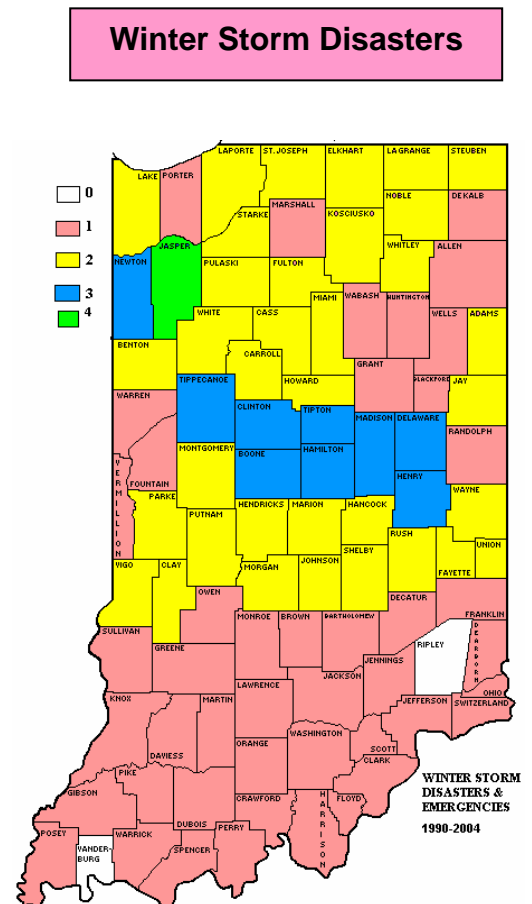
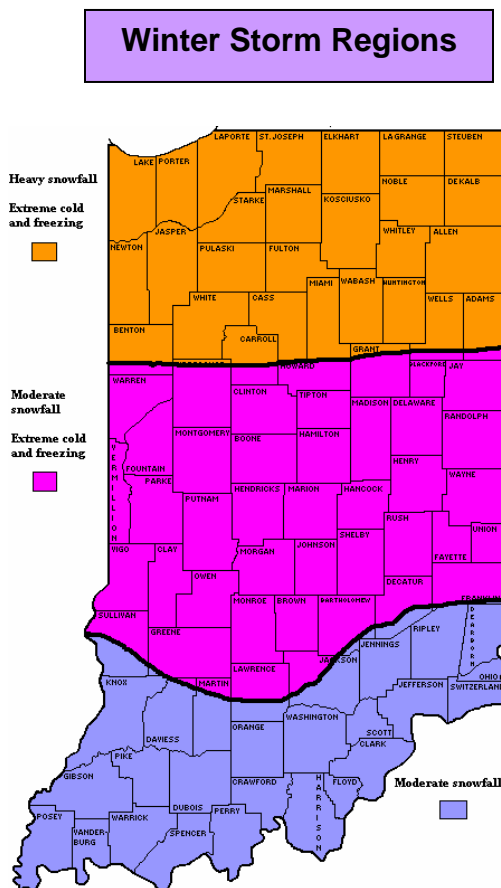
**Transportation Exposure** - The transportation network will be the first impacted. Snow and ice accumulations will make travel along these systems difficult or impossible. These types of storms do not usually destroy this type of infrastructure, but rather result in temporary effects. The problem is normally debris related. The freeze thaw of winter and its related damage to roads is normal and planned for throughout the state. Transportation is more likely to be affected by cascading events, such as debris from ice storms or flooding from excessive snowmelt.

**Other Infrastructure Exposure** - The storm of 1991 confirmed that a community's infrastructure is likely to experience the most physical damage. Power and communication equipment is vulnerable to winds, but the addition of ice on the lines quickly renders the community without power or communication. The loss of power may mean that communities and individuals may not have water, since it takes electricity to convey it to the customer. Towns and cities depend upon electricity to pump, treat and deliver water to their citizens.

**Economic Exposure** - Economically, industry and agriculture can suffer the effects of a winter storm. Both are dependent on transportation. The collapse of structures due to snow loading, loss of man-hours and inability to ship goods, receive material or to receive orders for goods and services will impact the economic community. Historically, Indiana has suffered agriculturally from loss of livestock or crops due to winter storms and cascading events such as flooding.

The cyclical nature of weather is evident in Indiana's winter weather. Extremely cold, snowy winters tend to congregate in multiple years; then there are long

periods when winters are milder. This fluctuation tends to breed complacency. In a non-disaster period, it is important to upgrade building codes on structures to make them more resistant to snow loading, require that critical facilities have and maintain backup power and communication systems, and maintain a reasonable ability to remove snow and debris from transportation corridors. An important aspect of this mitigation is public awareness of the dangers of winter weather and the remedies available that will help protect their health and safety and their property.



## Loss Estimation

The loss potential to above-ground infrastructure could be devastating. The lack of past history of frequent severe storms does not provide a large sample of information upon which to base loss estimates. The 1991 storm that brought a declaration for 21 counties in Indiana was by far the largest disaster in recent history. Winter storms in Indiana normally are not long-term recovery programs. These events normally only require emergency snow and debris removal. They



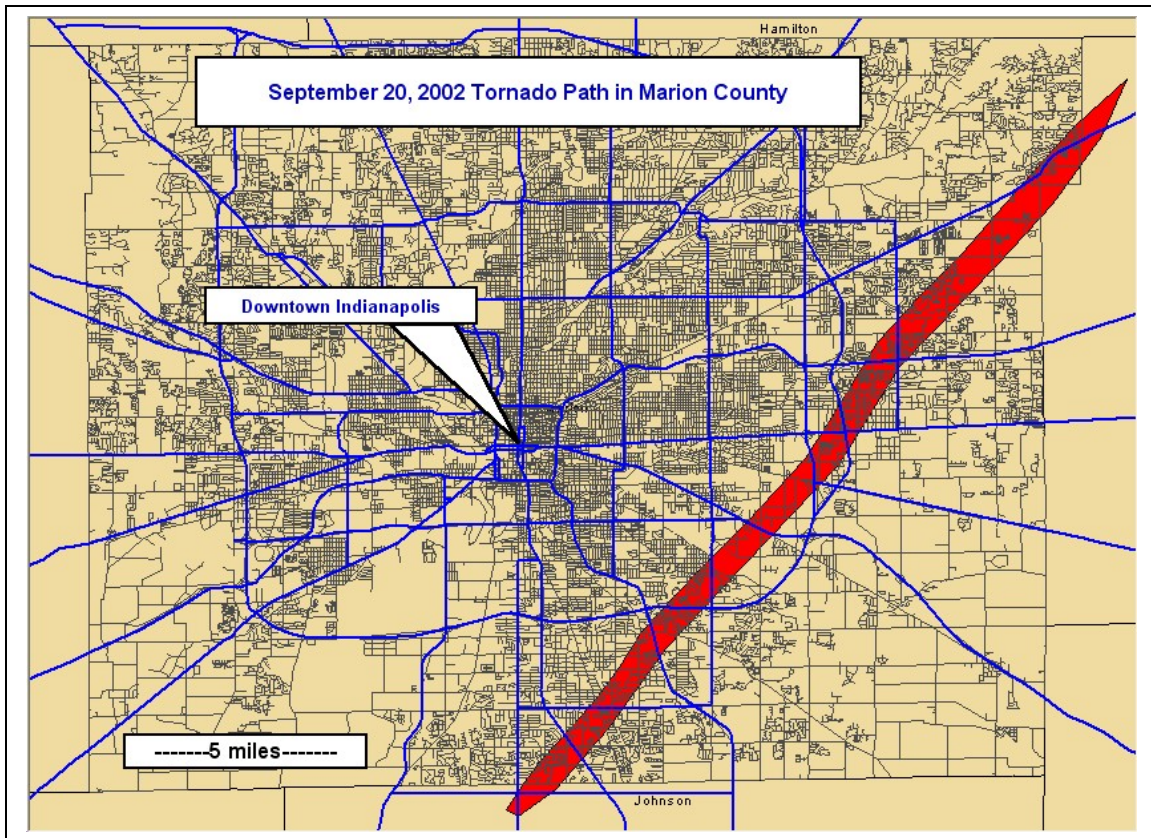
can also be deadly due to exposure, fire, carbon monoxide poisoning, and transportation accidents.

The lack of public awareness, preparedness and mitigation will result in increased losses as the population and the dependence upon technology continues. The recovery time to power and communication infrastructure can be improved by the requirement that electric and communications service lines be buried. The lack of

heat in residences and the exposure to cold is the greatest threat to people. Public education on the dangers of alternative heating systems, and what to do if caught outside during a storm

WINTER STORM DECLARATION EXPENDITURES			
DISASTER #	DATE	# OF COUNTIES	EXPENDITURES
DR-899	3/29/91	21	\$9,222,104.00
DR-1109	4/2/96	35	\$4,130,652.00
DR-1217	5/8/98	8	\$5,585,824.00
EM-3135	1/15/99	59	\$12,908,434.99
EM-3162	1/24/01	19	\$4,797,468.13
TOTAL			\$36,644,501.12

would reduce the risk to the population. These programs can prevent the state's exposure to loss from these storms from increasing as the population increases.



### **Tornado History**

Indiana's tornado history extends back to its early settlement. There are records of tornadoes occurring in Indiana as far back as 1814, but there are few statistics on these early twisters. The worst outbreak of tornadoes in the state's history, in terms of fatalities, occurred on Palm Sunday, April 11, 1965. There were at least 10 tornadoes and a number of lesser storms reported on that date. The official death toll for Indiana from this storm was 137. These Tornadoes also struck Illinois, Ohio, and Michigan. As the tornadoes moved across north central Indiana, they destroyed the Town of Russiaville, and caused extensive damage in Kokomo, Lebanon, and Marion. A total of 32 counties suffered damage; 18 of those counties experienced major damage. Seventy-one million dollars in private property damage and \$13.5 million in public property damage resulted from these storms.



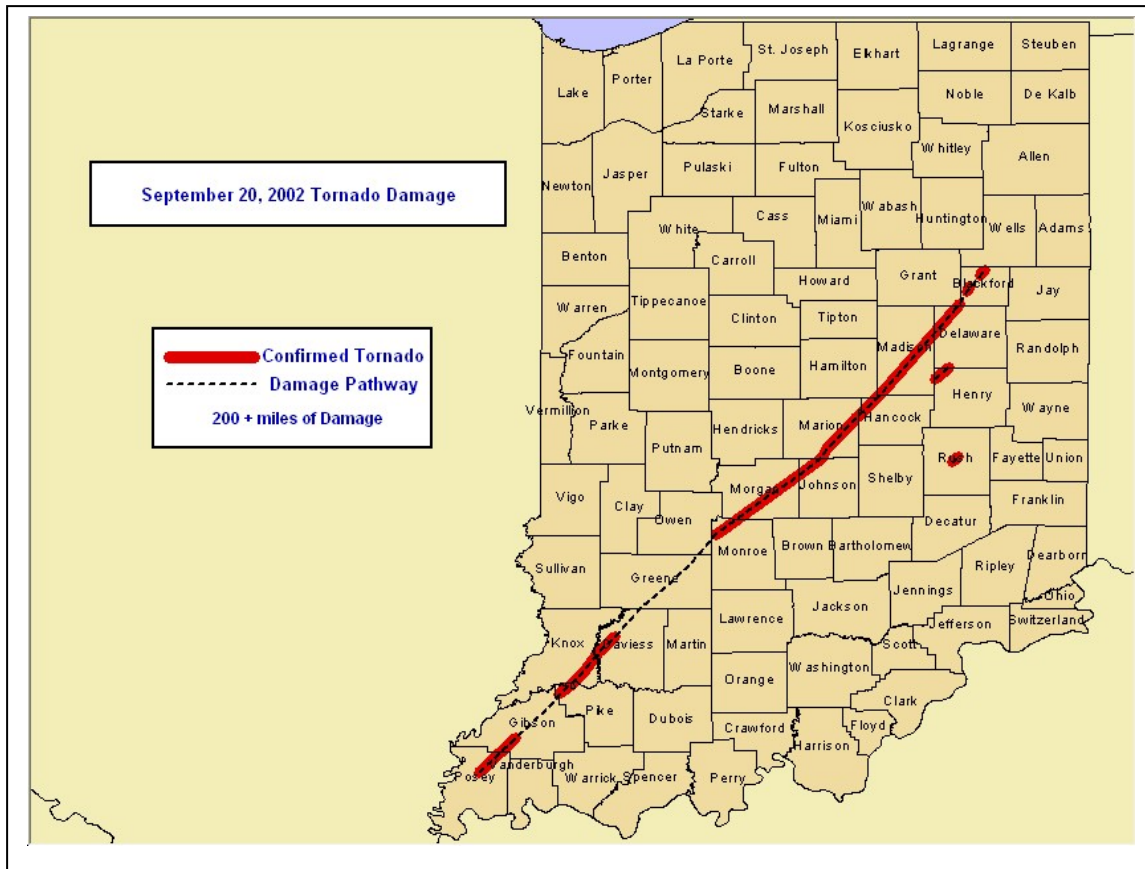
### **June 2003 Miami County Tornado Damage**

The second most deadly tornado day of record was on March 18, 1925, when 74 people were killed in southwest Indiana. Fifty deaths occurred in the City of Griffin in Posey County. The tornado all but destroyed the town. This Tornado set records for speed, path length and deaths per city. In Indiana, multiple funnels were occasionally visible, as the 3/4-mile-wide path of destruction continued with no letup. The town of Griffin lost 150 homes, and children were killed on their way home from school. Two deaths were in a bus. Another stretch of rural devastation occurred between Griffin and Princeton, passing just northwest of Owensville. About 85 farms were devastated in that area. About half of Princeton was destroyed, and losses there totaled \$1,800,000. The funnel dissipated about 10 miles northeast of Princeton.

On April 3, 1974, a Super Cell struck the Midwest and southern U.S. This series of storms produced 148 tornadoes across 13 states. Twenty-one tornadoes touched down in Indiana causing damage in 39 counties. The death toll in the state was 47 with nearly a thousand people hospitalized with storm-related injuries. Total losses to property, utilities and infrastructure approached \$100 million. The downtown business district in Monticello in White County was almost completely destroyed. This was the largest tornado outbreak ever in the United States.

On June 2, 1990, the largest outbreak of tornadoes hit Indiana; 37 tornadoes ripped across 31 counties, killing 8 people. Downtown Petersburg was severely damaged. Across the Midwest, this outbreak produced 64 tornadoes in 9 states, and killed 9 people.





On September 20, 2002, Indiana was again struck by a series of severe storms, which resulted in a Presidentially declared Tornado disaster for 32 of the counties. One of the tornadoes generated in this event struck Indianapolis and caused the second longest track in Indiana's history. This event represents the most concentrated outbreak of such weather in Indiana over the past 30 years. These storms produced tornadoes that caused extensive damage to homes, businesses, and public facilities throughout a significant portion of the State, doing over \$9,118,918.00 in damage.

March, April and May are the most severe tornado months. Tornadoes can occur at any hour of the day or night, but because of the meteorological combinations that create them, they form most readily during the warmer hours of the day. Most tornadoes occur between 3-9 p.m. The direction from which tornadoes strike has been reported in about 75% of the cases. Indications are that 80% of these tornadoes come from the West or Southwest. An historical survey of tornado accounts indicates that a tornado can occur in almost any section of the state and at any elevation, from hilltop to valley bottom. The greatest number of tornadoes have been observed and reported in central and northern Indiana.

## **INDIANA TORNADO RECORDS**

Most tornadoes in a day - 37 on June 2, 1990

Most tornadoes in a month - 44 in June, 1990  
Most tornadoes in a year - 49 in 1990  
Most tornado deaths in a single event - 137 on April 11, 1965

### ***INDIANA'S WORST TORNADOES***

April 13, 1852 New Harmony - 16 dead  
May 14, 1886 Anderson - 43 dead  
March 23, 1913 Terre Haute - 21 dead  
March 23, 1917 New Castle - 21 dead  
March 28, 1920 Allen through Wayne counties - 39 people killed by 3 tornadoes  
April 17, 1922 Warren through Delaware counties - 14 dead  
March 18, 1925 Tri-State tornado - 70 dead  
March 26, 1948 Vigo to Jay counties - 20 dead  
May 11, 1949 Sullivan and Clay counties - Coatsville destroyed, 14 dead  
April 11, 1965 Palm Sunday Outbreak - 11 tornadoes hit 20 counties, 137 dead  
April 3, 1974 Super Outbreak - 21 tornadoes hit 39 counties, 47 dead  
March 10, 1986 8 tornadoes hit central and southern 9 counties, 1 dead, 48 injured  
June 2, 1990 31 counties hit by 37 tornadoes, 8 dead, 220 injured

### **Tornado Vulnerability**

Based on reported damages from tornadoes, the following summaries explain what is vulnerable to such storms. This information provides helpful information in determining current and future damage exposure.

- Urbanized and industrial areas face the greatest vulnerability because of their concentration of buildings, population and lifeline utilities. Because of the nature of tornadoes, the exposure to loss increases as the population density increases.
- Electrical, water, and gas utilities are vulnerable because of direct or indirect impact caused as a result of the loss of power to water facilities, downed trees, debris, destroyed buildings, etc.
- Economic impact from loss of crops, livestock, storage facilities and light industry can have permanent or long-lasting impact on communities in many Indiana counties. Because the economy of some rural counties is less diversified, a single tornado may destroy the economic livelihood of a majority of the county's population.

## **Current Exposure**

**Population Exposure** - Due to the random patterns of tornadoes and the historical touchdown patterns in Indiana, the entire geographic area and population can be considered at risk. Although central and northern Indiana have been struck most frequently, all of the state's population is at potential risk. Tornado records in Indiana date back to 1814. On an annual basis since 1953 the State has averaged 1-3 tornadoes in the southern third of the state and 7-9 tornadoes in the central/north central area of the state. The statewide average during this time has been 21 tornadoes per year. The number of fatalities per annum numbered seven.

INDIANA TORNADO RANKINGS			
NUMBER	FATALITIES	INJURIES	ADJUSTED \$\$
(15) 886	(6) 218	(6) 3641	(2) \$164,865,433.00
<i>The numbers in ( ) reflect the National ranking of these categories from 1950-1995.</i>			

**Human Services Exposure** - Human service agencies (community support programs, health and medical services, public assistance programs and social services) often suffer the effects of a tornado. The two main effects are a loss of personnel and damage or destruction to local infrastructure. This damage consists of physical damage to facilities and equipment, disruption of emergency communications, loss of health and medical facilities and supplies and an overwhelming load of patients and clients who are suffering from the effects of the tornado.

**Transportation Exposure** - The current network of interstates, federal, state and county roads, and city streets should provide access to any area of Indiana in the event of tornadoes. It is anticipated that transportation blockage by damage and debris will be localized and temporary. Rail shipments should not be interrupted for any significant time even by major tornadoes. Air traffic can be re-routed to other airfields in the event of damage to a specific air terminal.

**Other Infrastructure Exposure** - Other infrastructure consists of public utilities, such as water, electric, gas and telephone. Loss of water can result from the lack of electric power to operate the equipment or from the damage and destruction of aboveground components of the supply network. Loss of the gas supply network should follow the pattern of the water system. Loss of electricity and telephone networks can result from the damage or destruction of aboveground components of the system. Loss of power can also result in the loss of water and sewage treatment capabilities.

**Economic Exposure** - The negative economic consequences from tornado damage can consist of destruction and damage to business and personal assets,

lost wages due to temporary or permanent closure of businesses, diminution of tax base due to destroyed assets, recovery costs, and lost investments in destroyed property.

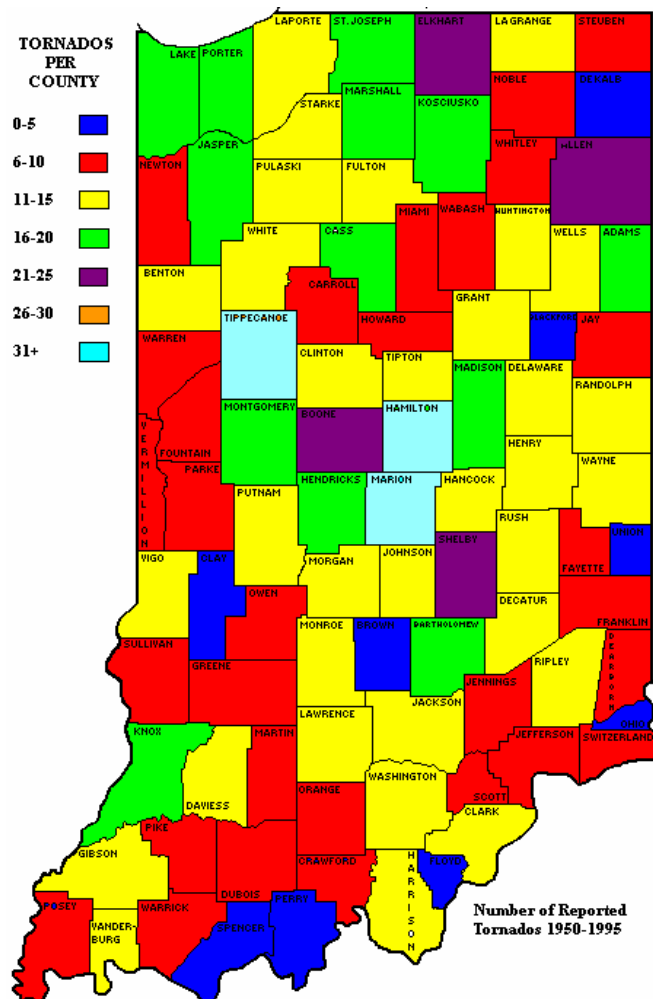
## **Future Exposure**

Due to the fact that tornadoes strike at random and since Indiana is located in "Tornado Alley," all of Indiana is considered exposed to tornadoes. Recent construction of new buildings to codes that address tornado strength winds will reduce damage in future events. Continuing efforts to increase public awareness to the dangers of tornadoes should mitigate injury, death and property losses in the future. As the population increases and more areas are developed, the potential damage from such storms will increase.

## **Loss Estimation**

### **Loss Potential**

- The loss potential from tornadoes cannot be accurately predicted given the tornado history of the state there is significant potential for injuries and loss of life, damage to the economic structure and damage to the infrastructure.
- Each tornado is an isolated column of wind. However each tornado can be part of larger systems known as Super Cells. These cells produce swarms of tornadoes over large geographic areas. Indiana has suffered major damage and loss of life from three of these Super Cells that covered large areas of the state.
- Potential within Indiana's "Tornado Alley" for widespread economic and personal loss.



The loss potential from tornadoes is due to buildings being toppled, mobile homes being overturned, trees being uprooted, people, vehicles, and animals being hurled through the air and the air being filled with wind borne debris. A 1989 publication from the U.S. Department of Commerce (National Weather Service) stated that between 1953 and 1980, Indiana annually averaged three deaths from eight tornadoes. Between 1950 and 1994 Indiana recorded 886 tornadoes that produced 1,025 touch downs and generated \$1.6 billion in property damage.

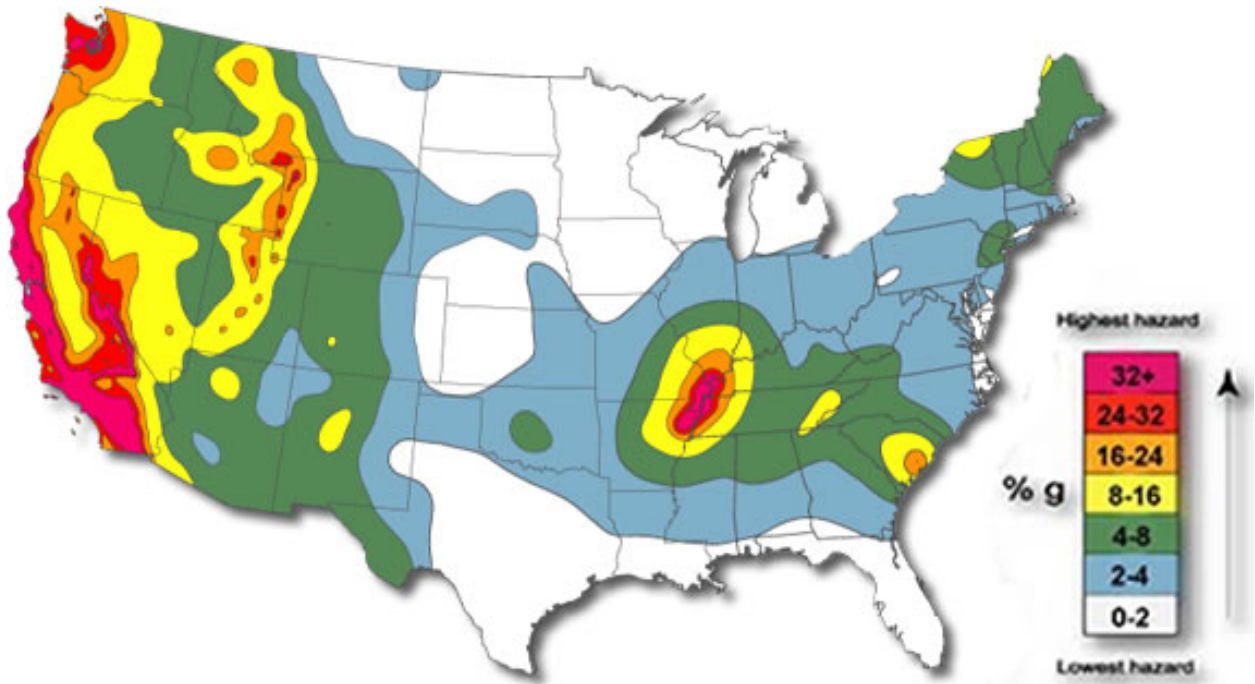
Failure to pursue a program of tornado preparedness and mitigation will result in increased loss of lives and property. Federal, state and local government information-education programs have saved many lives in the past. Many communities have incorporated tornado resistant standards into local building codes. Education programs in public schools teach children at an early age to be aware of the dangers of tornadoes and what action to take when one occurs. Special public awareness and information programs, such as Tornado Awareness Week sponsored by National Weather Service and the Indiana Emergency Management Community emphasize proper actions during a tornado. Without these kinds of programs and the continuing emphasis on tornado preparedness, the losses in lives and property can be expected to increase.

**The Fujita Tornado Scale, usually referred to as the F-Scale, classifies tornadoes based on the resulting damage. This scale was developed by Dr. T. Theodore Fujita (University of Chicago) in 1971.**

F-SCALE	WINDS	TYPE OF DAMAGE	FREQUENCY
F0	40-72 mph 64-116 km/h	MINIMAL DAMAGE: Some damage to chimneys, TV antennas, roof shingles, trees, and windows.	29%
F1	73-112 mph 117-180 km/h	MODERATE DAMAGE: Automobiles overturned, carports destroyed, trees uprooted.	40%
F2	113-157 mph 181-253 km/h	MAJOR DAMAGE: Roofs blown off homes, sheds and outbuildings demolished, mobile homes overturned.	24%
F3	158-206 mph 254-332 km/h	SEVERE DAMAGE: Exterior walls and roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests and farmland flattened.	6%
F4	207-260 mph 333-418 km/h	DEVASTATING DAMAGE: Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances.	2%
F5	261-318 mph 419-512 km/h	INCREDIBLE DAMAGE: Homes leveled with all debris removed. Schools, motels, and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished.	less than 1%



## United States Earthquake Hazard Map



### Earthquake History

Indiana's prehistoric features and recorded history indicate the state has been and will continue to be seismically active. Although most of the recent earthquakes in Indiana's history have been minor to moderate, there have been large earthquakes striking a history of Indiana. One of the largest earthquakes recorded in Indiana was a magnitude 5.2 or greater earthquake that struck near Sullivan, Indiana. With the evidence of large pre-historic earthquakes in and very near Indiana's borders, in the future it is very likely a large catastrophic earthquake will again strike Indiana.

The **New Madrid Seismic Zone** extends from Northwest Arkansas to the Southwest corner of Indiana. In the winter of 1811-1812, this region was struck by a series of the largest earthquakes recorded in the continental United States. The largest of the shocks exceeded an estimated magnitude 8.0, with over 2,500 after shocks. The force released by these earthquakes caused the Mississippi River to change course and flow backwards and church bells were rung in Boston, Massachusetts. Over 200 small earthquakes are reported in this region every year.

The **Wabash Valley Seismic Zone** extends up the Indiana/Illinois border from Western Kentucky. In recent history, the Wabash Valley Seismic Zone has produced a series of moderate earthquakes. In 1909, 1968, 1987, and 2002 this area has produced moderate size earthquakes in the range of magnitude 5.0.



Recently evidence of large earthquakes in the range of magnitude 7.0-7.5 that have occurred in the last 6000 years has been found on the Wabash and White Rivers near the Indiana/Illinois border. With this the cities of Evansville, Vincennes, Terre Haute, Indianapolis and the other smaller cities and towns within this region are drawn closer to seismically active areas.

The **Western Ohio Seismic Zone** located in Shelby and Auglaize Counties in Western Ohio have a history of producing moderate damaging earthquakes. Geologists believe that this seismic zone can cause larger earthquakes that can cause extensive damage in the region. Indiana Cities such as Ft. Wayne and Richmond lie nearly 50 miles from the Western Ohio Seismic Zone.

Earthquakes in the Central or Eastern United States affect much larger areas than similar earthquakes on the West Coast of the United States. For example, the Great San Francisco Earthquake of 1906 (Magnitude 7.8) was felt in 15,000 square miles around the epicenter. By contrast, the Great New Madrid Earthquake in 1811 was felt in over 2,000,000 square miles, where church bells in Boston were reported being rung. The Geology in the Central United State sits on loose unconsolidated soils that permit the further transmission of the earthquake's energy.

Differences in geology east and west of the Rocky Mountains cause this strong contrast. Indiana and the Midwest have not been traditionally been considered to be an active seismic area. However, given the states soil composition, the types of earthquake faults (intra plate faults) and the older less quake resistant structures (building and infrastructure) the damage would be likely be greater than that seen in the traditional earthquake area of Southern California for a similar magnitude earthquake. The areas most vulnerable do not change.



## EXPLANATION\*

- Average shear-wave velocity measured by IGG
- ▲ Average shear-wave velocity measured by Purdue University

**NEHRP Class D through F**  
 Fluvial (river) deposits of sand, mud, and gravel;  
 often mostly sand and water table is 5 to 8 ft below  
 from grade, liquefaction potential is high (class F)

**NEHRP Class D or F**  
 Dune sand, point bars, and sheet sands (class water table  
 is 5 to 8 ft below from grade)

**NEHRP Class D through E**  
 Thick and peat of glacial lake origin  
 Wisconsin age alluvium (small outcrops)

**NEHRP Class D and E**  
 Pre-Wisconsin glacial lake muds

**NEHRP Class D**  
 Wisconsin age glacial till  
 Loess and fine mud mixed  
 Mixed loess and sand from weathered bedrock; occurs on  
 eroded surfaces

**NEHRP Class C through D**  
 Made land

Loess (wind-blown silt)

Outwash sand and gravel

Pre-Wisconsin outwash sand and gravel

Pre-Wisconsin glacial till

Pre-Wisconsin outwash over till

Dense, hard, glacial till

**NEHRP Class C**  
 Loess over till (mostly class C)

**NEHRP Class B**  
 Pennsylvanian sandstone

Pennsylvanian-Mississippian sandstone, shale, and limestone

Middle Mississippian limestone

Middle Mississippian silt and shale

Mississippian limestone and shale

Mississippian Devonian shale

Sturtevant/Devonian limestone, shale, and dolomite

Ordovician limestone and shale

Thickness of unconsolidated materials; contour value indicates  
 maximum thickness; contour interval 50 feet

Approximate limit of Wisconsin glacial boundary

Pre-Wisconsin glacial boundary

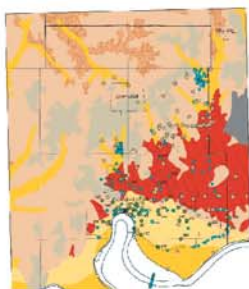
\*This map is a first approximation and should not be used for  
 design purposes.

## Soil Performance as a Function of Ground Shaking

[modified from Borcherdt, 1998] and from FEMA 346]

Soil Class	Typical	Shear Wave Velocity	Depth	Shear Modulus	Amplification
1	st	1000 ft/sec	1000 ft	1.0	1.0
2	st	1000 ft/sec	1000 ft	1.0	1.0
3	st	1000 ft/sec	1000 ft	1.0	1.0
4	st	1000 ft/sec	1000 ft	1.0	1.0
5	st	1000 ft/sec	1000 ft	1.0	1.0
6	st	1000 ft/sec	1000 ft	1.0	1.0
7	st	1000 ft/sec	1000 ft	1.0	1.0
8	st	1000 ft/sec	1000 ft	1.0	1.0
9	st	1000 ft/sec	1000 ft	1.0	1.0
10	st	1000 ft/sec	1000 ft	1.0	1.0
11	st	1000 ft/sec	1000 ft	1.0	1.0
12	st	1000 ft/sec	1000 ft	1.0	1.0
13	st	1000 ft/sec	1000 ft	1.0	1.0
14	st	1000 ft/sec	1000 ft	1.0	1.0
15	st	1000 ft/sec	1000 ft	1.0	1.0
16	st	1000 ft/sec	1000 ft	1.0	1.0
17	st	1000 ft/sec	1000 ft	1.0	1.0
18	st	1000 ft/sec	1000 ft	1.0	1.0
19	st	1000 ft/sec	1000 ft	1.0	1.0
20	st	1000 ft/sec	1000 ft	1.0	1.0
21	st	1000 ft/sec	1000 ft	1.0	1.0
22	st	1000 ft/sec	1000 ft	1.0	1.0
23	st	1000 ft/sec	1000 ft	1.0	1.0
24	st	1000 ft/sec	1000 ft	1.0	1.0
25	st	1000 ft/sec	1000 ft	1.0	1.0
26	st	1000 ft/sec	1000 ft	1.0	1.0
27	st	1000 ft/sec	1000 ft	1.0	1.0
28	st	1000 ft/sec	1000 ft	1.0	1.0
29	st	1000 ft/sec	1000 ft	1.0	1.0
30	st	1000 ft/sec	1000 ft	1.0	1.0
31	st	1000 ft/sec	1000 ft	1.0	1.0
32	st	1000 ft/sec	1000 ft	1.0	1.0
33	st	1000 ft/sec	1000 ft	1.0	1.0
34	st	1000 ft/sec	1000 ft	1.0	1.0
35	st	1000 ft/sec	1000 ft	1.0	1.0
36	st	1000 ft/sec	1000 ft	1.0	1.0
37	st	1000 ft/sec	1000 ft	1.0	1.0
38	st	1000 ft/sec	1000 ft	1.0	1.0
39	st	1000 ft/sec	1000 ft	1.0	1.0
40	st	1000 ft/sec	1000 ft	1.0	1.0
41	st	1000 ft/sec	1000 ft	1.0	1.0
42	st	1000 ft/sec	1000 ft	1.0	1.0
43	st	1000 ft/sec	1000 ft	1.0	1.0
44	st	1000 ft/sec	1000 ft	1.0	1.0
45	st	1000 ft/sec	1000 ft	1.0	1.0
46	st	1000 ft/sec	1000 ft	1.0	1.0
47	st	1000 ft/sec	1000 ft	1.0	1.0
48	st	1000 ft/sec	1000 ft	1.0	1.0
49	st	1000 ft/sec	1000 ft	1.0	1.0
50	st	1000 ft/sec	1000 ft	1.0	1.0

\*EXPLANATION:  
 The map is a first approximation of the soil performance as a function of ground shaking. It is not intended to be used for design purposes. The map is based on the best available information and is subject to change as more information becomes available. The map is intended to provide a general overview of the soil performance as a function of ground shaking and is not intended to be used for design purposes.

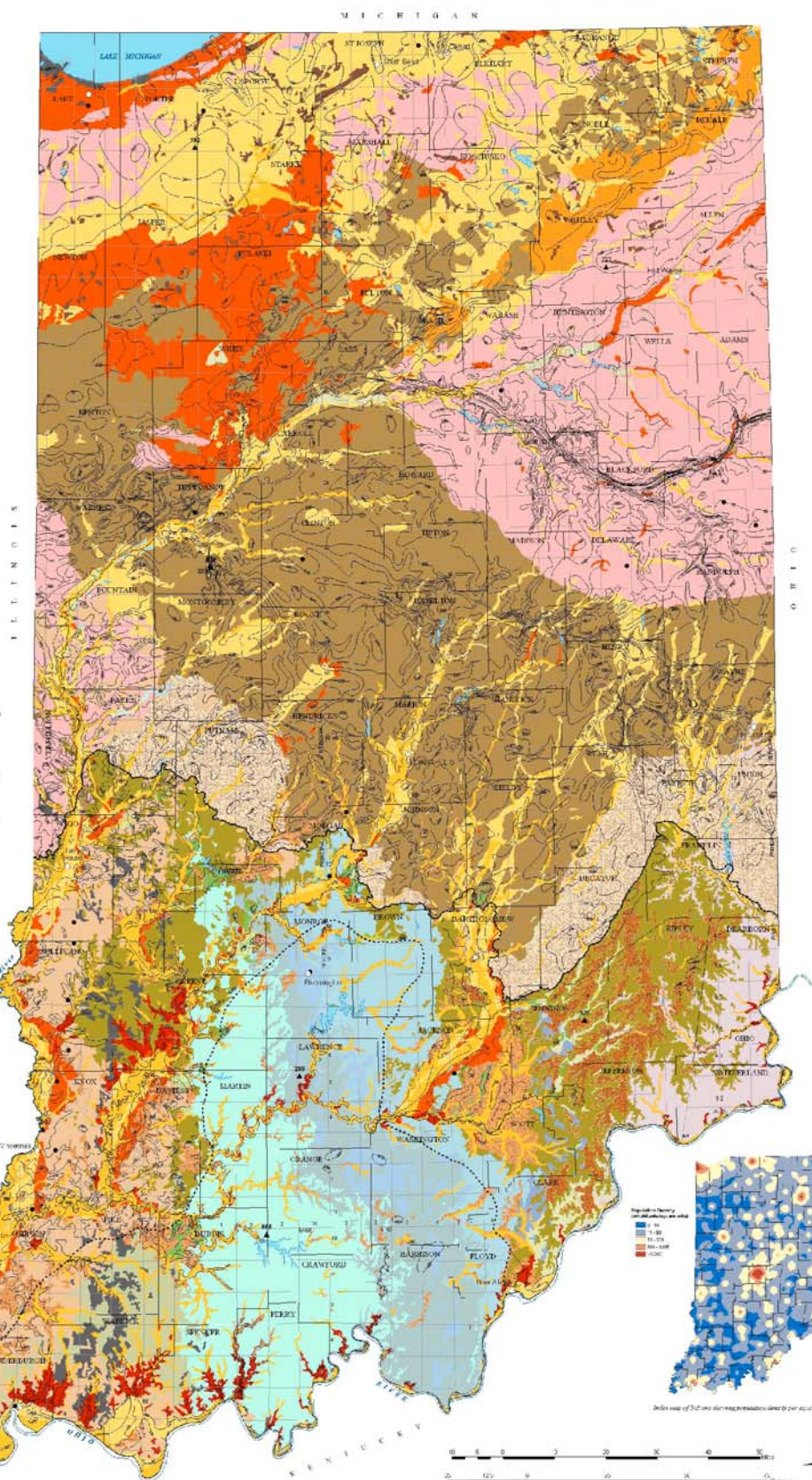


Inset map of Indiana showing the location of the  
 main map area (2001)

INDIANA  
 State  
 Emergency  
 Management  
 Agency



Copyright 2001 by the Indiana Geological Survey. All rights reserved. This map is a first approximation and should not be used for design purposes. The map is based on the best available information and is subject to change as more information becomes available. The map is intended to provide a general overview of the soil performance as a function of ground shaking and is not intended to be used for design purposes.



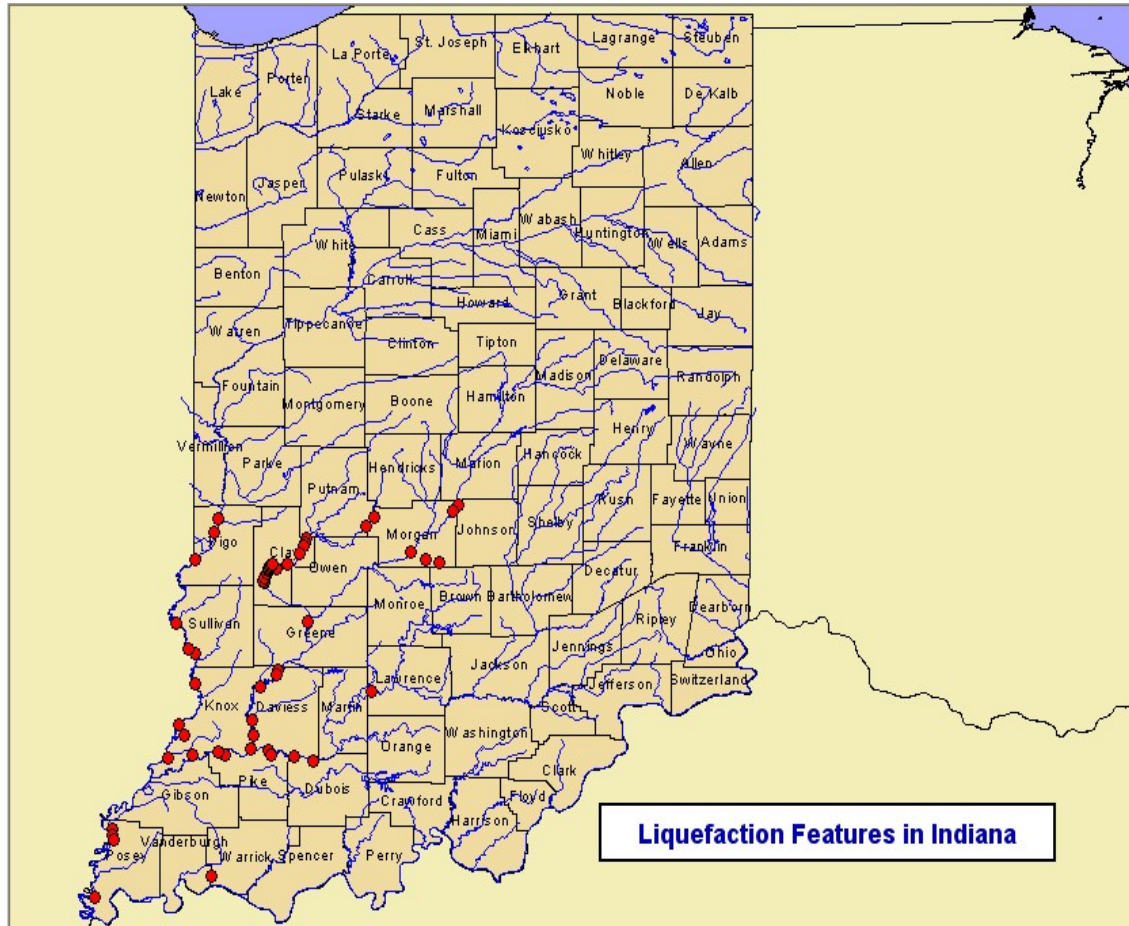
Inset map of Indiana showing the location of the  
 main map area (2001)

## Seismic Hazard Map of Indiana: a First Approximation

By  
 John R. Hill and David T. Foster  
 2001



Urban areas, especially those along large river basins, are the most vulnerable due to their dense population and older built environments. Ground transportation systems would also be vulnerable. They are old and lack earthquake resistant construction. Utilities such as power, water, sewage, gas, petroleum pipelines, and communications are extremely vulnerable. Very few systems were built with earthquake resistance as part of their design.



## Vulnerability

If an earthquake of moderate strength should occur along any of these faults or systems of faults, there would be additional populations in the surrounding counties that would be affected. An earthquake of significant magnitude along any faults would be felt throughout the state and surrounding states. Damage in nearby states could limit response capabilities.

**Human Services** – Human Services Agencies with facilities within the affected area would face a triple onslaught. Their structure may be damaged. Personnel will be impacted as the general population. They will experience an overwhelming influx of patients and clients. The equipment and supplies lost because of damage to storage facilities, lack of communication, and damage to emergency vehicles and transportation routes will seriously tax their ability to respond during the emergency.

**Transportation Exposure** – The aging transportation infrastructure, its type of construction and the state topography will severely limit access to the area for some period of time. This will seriously hinder the initial recovery effort. Air traffic could be a means of accessing some parts of the affected areas. Without all of its roadways, bridges, and rail lines intact, affected areas will have limited access. The long reconstruction time of roadways, bridges and rail lines could critically impede the recovery efforts.

**Other Infrastructure Exposure** – The ground shaking and other geological effects such as liquefaction from an earthquake cause damage and destruction to above and below ground system components of utilities. Some changes may be permanent, i.e.; communities who depend on wells for water supply may lose those wells permanently for water supply because of geological changes. Damage to other utilities such as electrical, communications, sewer, ruptured gas lines can have cascading effects—lack of water distribution systems may hinder firefighting efforts and spread of communicable diseases due to damaged waste disposal systems.

**Economic Exposure** – A strong earthquake in the Central United States would have a devastating negative impact on the communities within the Central United States. The loss of personal property and the disruption of normal life for the area inhabitants would be compounded by the possible permanent loss of business and industry. Large portions of the population depend on community-based industries for employment and creation of goods and services that may not recover from the losses suffered as a result of such a quake.

### ***Future Exposure***

As the population grows, the infrastructure continues to age, and business continues as usual, future earthquake exposure will expand exponentially. Upgraded codes will protect newer construction. However, decreasing public interest in earthquake safety due to the relative inactivity of the fault systems presents a serious problem to overcome.

### ***Loss Estimation***

#### **Loss Potential**

- The lack of development and technology at the time of damaging earthquakes means there is little statistical and historical

earthquake data from which to derive accurate information about the damage incurred in the region. However, by taking into account the damage that occurred in the 1811-1812 earthquakes and historical damage from other earthquakes of the late 1800's and 1900's, the scope and magnitude of such an event would be devastating to the impacted communities. The cost would likely exceed the cost of the 1994 Los Angeles earthquake. It is highly probable that the amount of assistance available to Indiana from state and federal sources would be inadequate to return economic life to its pre-earthquake condition. The length of recovery process from such a quake would also most likely have a negative impact on those few individuals who suffered little or negligible damage as a result of the shaking.

- The loss from a strong-magnitude earthquake within or near the Indiana borders could affect most if not all of the state. Because of the lack of retrofitting and inadequate earthquake resistant design, the transportation infrastructure damage from a quake along the seismic zones would be unprecedented in the state. Indiana is crossroads for major intrastate systems. Damage to these roads would impede disaster response and recovery efforts, and impact the economic stability of the state.
- Damage from a major earthquake along the New Madrid, Wabash Valley or Western Ohio Seismic Zones would far exceed that caused by any of the tornadoes, floods or transportation disasters that the state has experienced.

**Potential Impact of No Action** – The lack of public awareness, the lack of enforcement of the stricter earthquake resistant building code and continued growth of population and urbanization increase the potential loss and slow the recovery process from a major earthquake. The declining public interest in earthquake preparedness and mitigation is a serious problem the state must overcome.

Recognizing these problems, the Federal Emergency Management Agency, seven state emergency management agencies and other organizations joined efforts and formed the Central United States Earthquake Consortium (CUSEC). CUSEC formed in 1983, with member states of Indiana, Illinois, Kentucky, Tennessee, Arkansas, Mississippi and Missouri. Alabama was added in 2003 as a charter state.

- Coordinates multi-state planning, mitigation and encourages research in earthquake hazard reduction.
- Coordinates efforts with the state earthquake program managers, state department of transportation and operations chiefs.

United States Geological Survey (USGS) in 1990 advised by private and government experts issued a plan for:

- Intensified study of the New Madrid Seismic Zone. At the same time, the National Earthquake Hazards Reduction Program expanded efforts in the Central United States.
- Earthquake education is now part of the curriculum in the schools of many CUSEC states.
- In 1993, with USGS support and collaboration, the CUSEC state geologists began a significant effort to map earthquake hazards. In 1995 they completed a regional soils map that can be used to locate areas likely to experience shaking in earthquakes.
- Most CUSEC states have adopted building codes containing modern earthquake design standards.
- Efforts to ensure the seismic safety of critical structures such as dams, bridge and highway systems have accelerated.

Strong earthquakes in the Central United States are certain to occur in the future. In contrast to the Western United States, the causes and effects of earthquakes in the Central and Eastern United States are just beginning to be understood. Through better understanding of earthquake hazards and through public education, earth scientists and engineers are helping to protect the citizens of all parts the United States from loss of life and property on future earthquakes.

## **HAZUS & ATC-21**

Earthquake Loss estimates are forecasts of damage and human and economic impacts that may result from future earthquakes. They are not precise predictions, but rather estimates based on current scientific and engineering knowledge. Hazards U.S. (HAZUS) and Applied Technology Council-21 (ATC-21) represent an interesting technology in the risk assessment of earthquake occurrence and building vulnerability.

The FEMA HAZUS loss estimation methodology is a software program that uses mathematical formulas and information about building stock, local geology and the location and size of potential earthquakes, economic data, population and other information to estimate losses from a potential earthquake. Once the location and size of a hypothetical earthquake is identified, HAZUS will estimate the violence of ground shaking, the number of buildings damaged the number of casualties, amount of damage to transportation systems as well as utilities, displaced persons and estimate cost of repairing projected damage.

ATC-21 is a rapid seismic evaluation of critical facilities along with a database that stores and tracks that information. It is a method to evaluate already constructed buildings for seismic and risk vulnerability. In addition, IDHS is encouraging communities in seismic risk areas to be trained in HAZUS and ATC-21 data collection. HAZUS and ATC-21 are very compatible; the information that ATC-21 generates is the same information used in HAZUS for vulnerability and risk monitoring.

MERCALI SCALE	CHARACTERISTIC EFFECTS	RICHTER SCALE	
		WESTERN US	EASTERN US*
<b>I INSTRUMENTAL</b>	Detected only by seismography.	3.5 – 4.2	
<b>II FEEBLE</b>	Noticed only by sensitive people		
<b>III SLIGHT</b>	Like the vibrations caused by a heavy truck passing. Felt by people at rest, especially on upper floors.		
<b>IV MODERATE</b>	Felt by people while walking. Objects rock – including standing vehicles.	4.3 – 4.8	
<b>V RATHER STRONG</b>	Felt generally. Most sleepers are awakened.		
<b>VI STRONG</b>	Trees sway. Suspended objects swing. Loose objects overturn or fall.	4.9 – 5.4	4.3 – 4.8
<b>VII VERY STRONG</b>	General alarm. Walls crack. Plaster falls.	5.5 – 6.1	4.9 – 5.4
<b>VIII DESTRUCTIVE</b>	Masonry cracks. Chimneys fall. Poorly constructed buildings damaged. Water well levels may change.	6.2 – 6.9	4.9 – 5.4
<b>IX RUINOUS</b>	Houses collapse where ground begins to crack. Pipes break open.		5.5 – 6.1
<b>X DISASTEROUS</b>	Ground cracks badly. Many buildings destroyed and railway lines bent. Landslides on steep slopes.	7.0 – 7.3	6.5
<b>XI VERY DISASTEROUS</b>	Few buildings remain standing. Bridges destroyed. All services (railway lines, water-sewage pipes, and TV-phone cables) out of action. Great landslides and floods.	7.4 – 8.1	6.5
<b>XII CATASTROPHIC</b>	Total destruction. Objects thrown into air. Ground rises and falls in waves.	8.1	6.5

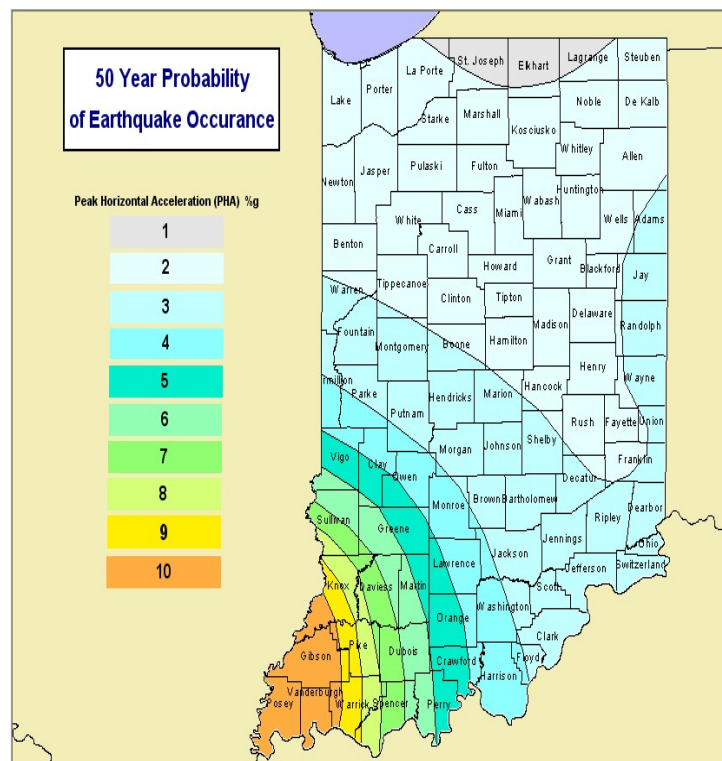
Source: **Stover and Coffman, 1993**



<b>EARTHQUAKE AT RISK POPULATION</b>		
<b>SEISMIC ZONE/FAULT</b>	<b>AT RISK POPULATION</b>	
NEW MADRID SEISMIC	1,455,801	
WESTERN OHIO SEISMIC (PRIMARY)*	526,497	
WESTERN OHIO (SECONDARY)*	36,026	
WABASH VALLEY FAULT	2,123,397	
	<b>Total</b>	<b>4,141,721</b>

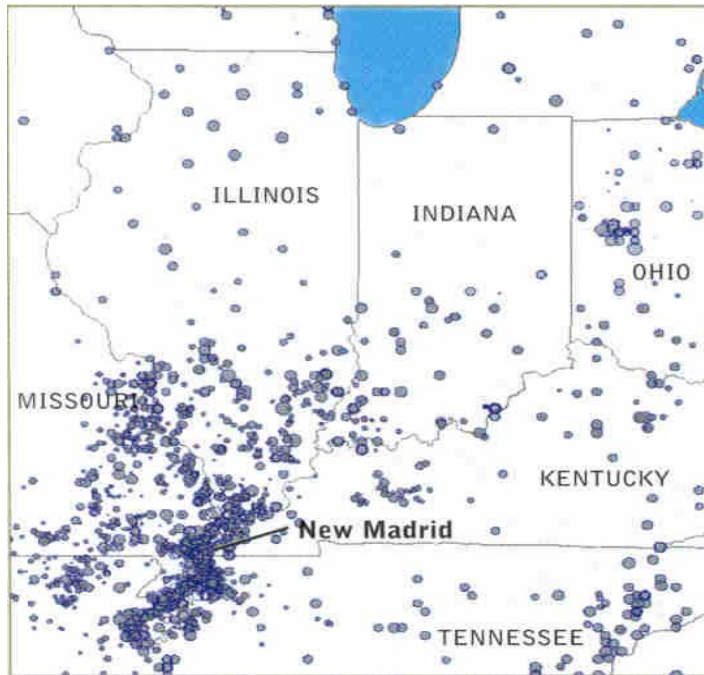
- Primary counties are those that will be most affected •

### 50 Year Earthquake Occurrence Probability



Graphic shows the peak horizontal acceleration experienced during an earthquake with a 50 year return period.

### Central U.S. Historical Earthquakes



### 3.3 Assessing Vulnerability by Jurisdiction

The matrix below summarizes the vulnerability by Jurisdiction on a County basis for five hazards that outlined above. Since no local All Hazard Mitigation Plans were available, the State of Indiana used historical data and models, such as HAZUS-MH, to determine the vulnerability of the various jurisdictions. (See Section 5.3 for the status of local plans.) The communities with the Highest vulnerability are the most likely to experience the identified hazard and are the ones to experience the greatest damage to structures. Because of the lack of enforceable building code and construction inspection it is difficult to distinguish which structures are more resistant to tornadoes, wind and snow storms. We can generalize that homes in the northern third are least likely to suffer damage from snowstorms, but they are more likely to experience heavy snows. Conversely, homes and structures in the southern third of the state are more likely to suffer damage due to snow load, but are also less likely to experience heavy snows. Additionally, communities that have adopted the International Building Code are more resistant to the damages from wind, snow and earthquake. However, in Indiana the greatest risk of residents and structures is the loss of essential services such as electricity, natural gas and water resources all of which are highly vulnerable to winter storms, earthquakes and to a limited extent tornadoes and flood.

Few structures if any can withstand the direct impact of a tornado of F-4 or greater. Only those areas constructed as shelters for tornadoes have withstood such direct impact. However, it is not cost effective to build all structures to withstand such winds. Therefore, all structures in Indiana are vulnerable to tornadoes, and all areas of the state appear to have an equal probability of experiencing tornadoes. The country's "tornado alley" extends into the state of Indiana.

The Earthquake Annualized Loss generated as a result of a statewide earthquake analysis is contained in Appendix I by county and the state. The annualized probability was done by running a 50, 500 and 2500 year return earthquake. These reports were determined by using HAZUS earthquake model with the default data. The state has received a Pre-disaster Mitigation grant to begin improving the data, and as county plans are developed the information will be improved.

## Hazard Vulnerability by County

COUNTY	FLOODING				TORNADOES				EARTHQUAKES				WINTER STORMS			
	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability
ADAMS	12.30	4,061	24	H	100	33,592	24	H	1.63	33,592	24	L	100	33,592	24	M
ALLEN	5.94	20,253	175	H	100	340,153	175	H	1.07	340,153	175	L	100	340,153	175	M
BARTHOLOMEW	9.50	7,194	59	H	100	72,341	59	H	2.64	72,341	59	L	100	72,341	59	M
BENTON	3.05	276	18	H	100	9,189	18	H	1.62	9,189	18	L	100	9,189	18	M
BLACKFORD	0.63	82	13	H	100	13,867	13	H	1.27	13,867	13	L	100	13,867	13	M
BOONE	7.48	3,809	44	H	100	49,370	44	H	2.05	49,370	44	L	100	49,370	44	M
BROWN	9.52	1,267	14	H	100	15,316	14	H	2.8	15,316	14	L	100	15,316	14	M
CARROLL	48.14	8,819	16	H	100	20,499	16	H	1.26	20,499	16	L	100	20,499	16	M
CASS	36.10	15,361	30	H	100	40,415	30	H	1.11	40,415	30	L	100	40,415	30	M
CLARK	8.78	7,744	103	H	100	99,482	103	H	3.38	99,482	103	M	100	99,482	103	M
CLAY	3.33	280	38	H	100	26,772	38	H	5.39	26,772	38	M	100	26,772	38	M
CLINTON	8.58	2,830	29	H	100	33,947	29	H	1.58	33,947	29	L	100	33,947	29	M
CRAWFORD	6.70	498	13	H	100	11,146	13	H	6.34	11,146	13	M	100	11,146	13	M
DAVIES	2.36	563	33	H	100	30,047	33	H	10.01	30,047	33	H	100	30,047	33	M
DEARBORN	3.55	1,413	43	H	100	47,849	43	H	1.83	47,849	43	L	100	47,849	43	M
DECATUR	15.62	3,857	56	H	100	24,747	56	H	2.17	24,747	56	L	100	24,747	56	M
DEKALB	20.68	8,226	35	H	100	41,129	35	H	0.87	41,129	35	L	100	41,129	35	M
DELAWARE	4.00	4,090	102	H	100	117,488	102	H	1.35	117,488	102	L	100	117,488	102	M
DUBOIS	2.62	895	62	H	100	40,200	62	H	9.89	40,200	62	M	100	40,200	62	M

COUNTY	FLOODING				TORNADOES				EARTHQUAKES				WINTER STORMS			
	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability
ELKHART	3.78	6,652	120	H	100	188,779	120	H	0.76	188,779	120	L	100	188,779	120	M
FAYETTE	15.97	4,075	23	H	100	24,999	23	H	1.46	24,999	23	L	100	24,999	23	M
FLOYD	3.41	2,776	81	H	100	71,148	81	H	3.65	71,148	81	L	100	71,148	81	M
FOUNTAIN	32.52	5,978	19	H	100	17,750	19	H	2.55	17,750	19	L	100	17,750	19	M
FRANKLIN	3.66	704	13	H	100	22,773	13	H	1.67	22,773	13	L	100	22,773	13	M
FULTON	29.56	5,174	24	H	100	20,508	24	H	0.93	20,508	24	L	100	20,508	24	M
GIBSON	3.66	1,032	45	H	100	32,991	45	H	15.64	32,991	45	H	100	32,991	45	M
GRANT	15.61	10,968	83	H	100	71,572	83	H	1.21	71,572	83	L	100	71,572	83	M
GREENE	2.74	641	28	H	100	33,244	28	H	7.31	33,244	28	M	100	33,244	28	M
HAMILTON	4.06	6,847	95	H	100	216,826	95	H	1.7	216,826	95	L	100	216,826	95	M
HANCOCK	27.13	15,162	42	H	100	59,446	42	H	1.68	59,446	42	L	100	59,446	42	M
HARRISON	3.76	1,034	40	H	100	35,706	40	H	5	35,706	40	L	100	35,706	40	M
HENDRICKS	24.78	26,391	68	H	100	118,850	68	H	2.45	118,850	68	L	100	118,850	68	M
HENRY	15.34	7,303	46	H	100	47,699	46	H	1.41	47,699	46	L	100	47,699	46	M
HOWARD	23.76	20,503	55	H	100	84,880	55	H	1.28	84,880	55	L	100	84,880	55	M
HUNTINGTON	34.90	13,226	50	H	100	38,143	50	H	1.08	38,143	50	L	100	38,143	50	M
JACKSON	9.61	3,827	45	H	100	41,639	45	H	3.12	41,639	45	M	100	41,639	45	M
JASPER	15.12	4,306	19	H	100	31,078	19	H	1.22	31,078	19	L	100	31,078	19	M
JAY	22.81	5,072	19	H	100	21,372	19	H	1.81	21,372	19	L	100	21,372	19	M
JEFFERSON	3.99	901	42	H	100	32,250	42	H	2.5	32,250	42	L	100	32,250	42	M
JENNINGS	7.70	2,165	24	H	100	28,111	24	H	2.77	28,111	24	L	100	28,111	24	M
JOHNSON	2.88	3,258	76	H	100	123,256	76	H	2.39	123,256	76	L	100	123,256	76	M

COUNTY	FLOODING				TORNADOES				EARTHQUAKES				WINTER STORMS			
	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability
KNOX	2.54	653	50	H	100	38,745	50	H	13.19	38,745	50	H	100	38,745	50	M
KOSCIUSKO	14.07	6,925	67	H	100	75,301	67	H	0.91	75,301	67	L	100	75,301	67	M
LAGRANGE	10.56	3,648	32	H	100	36,026	32	H	0.77	36,026	32	L	100	36,026	32	M
LAKE	8.78	39,380	428	H	100	487,476	428	H	1.18	487,476	428	L	100	487,476	428	M
LAPORTE	3.00	2,672	95	H	100	109,878	95	H	0.86	109,878	95	L	100	109,878	95	M
LAWRENCE	5.66	2,453	31	H	100	46,201	31	H	5.46	46,201	31	M	100	46,201	31	M
MADISON	24.42	33,093	79	H	100	131,121	79	H	1.33	131,121	79	L	100	131,121	79	M
MARION	5.71	47,743	588	H	100	863,251	588	H	2.2	863,251	588	L	100	863,251	588	M
MARSHALL	17.70	8,542	47	H	100	46,352	47	H	0.86	46,352	47	L	100	46,352	47	M
MARTIN	17.60	1,796	61	H	100	10,347	61	H	7.99	10,347	61	M	100	10,347	61	M
MIAMI	36.07	12,880	31	H	100	36,177	31	H	1.11	36,177	31	L	100	36,177	31	M
MONROE	2.20	1,466	91	H	100	122,903	91	H	4.68	122,903	91	M	100	122,903	91	M
MONTGOMERY	11.62	4,232	36	H	100	37,911	36	H	2.69	37,911	36	L	100	37,911	36	M
MORGAN	10.26	7,455	44	H	100	68,656	44	H	2.81	68,656	44	L	100	68,656	44	M
NEWTON	14.70	1,982	20	H	100	14,403	20	H	1.32	14,403	20	L	100	14,403	20	M
NOBLE	9.65	5,019	32	H	100	47,039	32	H	0.85	47,039	32	L	100	47,039	32	M
OHIO	7.95	385	7	H	100	5,732	7	H	1.92	5,732	7	L	100	5,732	7	M
ORANGE	2.94	565	7	H	100	19,616	7	H	6.55	19,616	7	M	100	19,616	7	M
OWEN	8.20	1,570	11	H	100	22,827	11	H	4.93	22,827	11	M	100	22,827	11	M
PARKE	35.65	5,539	18	H	100	17,329	18	H	4.1	17,329	18	M	100	17,329	18	M
PERRY	7.67	1,242	26	H	100	18,717	26	H	4.81	18,717	26	M	100	18,717	26	M
PIKE	1.49	151	14	H	100	12,931	14	H	12.76	12,931	14	H	100	12,931	14	M

COUNTY	FLOODING				TORNADOES				EARTHQUAKES				WINTER STORMS			
	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability
PORTER	14.64	20,093	91	H	100	152,533	91	H	1.05	152,533	91	L	100	152,533	91	M
POSEY	7.98	1,872	61	H	100	26,876	61	H	12.91	26,876	61	H	100	26,876	61	M
PULASKI	36.76	4,734	14	H	100	13,835	14	H	1.16	13,835	14	L	100	13,835	14	M
PUTNAM	8.25	4,137	40	H	100	36,692	40	H	3.83	36,692	40	L	100	36,692	40	M
RANDOLPH	15.29	4,121	38	H	100	26,833	38	H	1.43	26,833	38	L	100	26,833	38	M
RIPLEY	5.36	1,345	39	H	100	27,316	39	H	2.02	27,316	39	L	100	27,316	39	M
RUSH	23.22	4,214	16	H	100	18,016	16	H	1.72	18,016	16	L	100	18,016	16	M
ST JOSEPH	16.72	42,603	175	H	100	266,348	175	H	0.72	266,348	175	L	100	266,348	175	M
SCOTT	2.67	582	6	H	100	23,556	6	H	2.97	23,556	6	L	100	23,556	6	M
SHELBY	35.37	15,345	32	H	100	43,717	32	H	2.06	43,717	32	L	100	43,717	32	M
SPENCER	11.40	2,252	31	H	100	20,343	31	H	12.14	20,343	31	H	100	20,343	31	M
STARKE	7.37	1,998	19	H	100	23,139	19	H	0.96	23,139	19	L	100	23,139	19	M
STEUBEN	17.88	4,155	23	H	100	33,706	23	H	0.82	33,706	23	L	100	33,706	23	M
SULLIVAN	2.16	449	21	H	100	21,861	21	H	8.32	21,861	21	M	100	21,861	21	M
SWITZERLAND	7.49	487	14	H	100	9,435	14	H	1.4	9,435	14	L	100	9,435	14	M
TIPPECANOE	11.15	16,837	65	H	100	154,848	65	H	1.57	154,848	65	L	100	154,848	65	M
TIPTON	21.70	3,781	19	H	100	16,422	19	H	1.27	16,422	19	L	100	16,422	19	M
UNION	22.26	1,472	6	H	100	7,238	6	H	1.49	7,238	6	L	100	7,238	6	M
VANDERBURGH	8.43	14,010	158	H	100	171,889	158	H	18.67	171,889	158	H	100	171,889	158	M
VERMILLION	31.37	5,146	22	H	100	16,572	22	H	4.14	16,572	22	M	100	16,572	22	M
VIGO	3.11	2,885	77	H	100	104,540	77	H	6.46	104,540	77	M	100	104,540	77	M
WABASH	36.38	12,888	41	H	100	34,339	41	H	1.08	34,339	41	L	100	34,339	41	M

COUNTY	FLOODING				TORNADOES				EARTHQUAKES				WINTER STORMS			
	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability	% of structures exposed	Population affected	Critical Facilities	Vulnerability
WARREN	44.82	3,883	13	H	100	8,703	13	H	2.18	8,703	13	L	100	8,703	13	M
WARRICK	4.38	2,107	57	H	100	54,744	57	H	12.48	54,744	57	H	100	54,744	57	M
WASHINGTON	4.35	1,249	17	H	100	27,618	17	H	4.47	27,618	17	M	100	27,618	17	M
WAYNE	25.60	17,818	65	H	100	70,235	65	H	1.47	70,235	65	L	100	70,235	65	M
WELLS	16.62	4,491	20	H	100	27,912	20	H	1.28	27,912	20	L	100	27,912	20	M
WHITE	48.56	9,068	22	H	100	24,852	22	H	1.24	24,852	22	L	100	24,852	22	M
WHITLEY	9.40	3,069	32	H	100	31,651	32	H	0.94	31,651	32	L	100	31,651	32	M
STATEWIDE	11.10	635,995	5013	H	100	6,195,643	5013	H	3.45	6,195,643	5,013	L	100	6,195,643	5,013	M

**Vulnerability H=High; M=Moderate; L=Low**

The vulnerability listing for the above hazards is also used as the probability listing for each community for each hazard. Those with a high vulnerability also have the greatest probability of the event occurring within the community. The same holds true for communities with medium and low vulnerabilities, their probabilities match the vulnerability rating.



### Average recurrence intervals for May-June 2004 floods in Indiana

Stream and Station			Peak discharge (ft <sup>3</sup> /sec) 1	Date	Average recurrence interval, in years		
Name	Lat.	Long.			Ranking 2	Curve 3	Use
Ohio River at Cannelton 4	37.89944	-86.70556	520,000	6/02		2	2
Wabash River at Covington	40.14000	-87.40556	72,000	6/14	5.3	10	10
at Lafayette	40.42194	-86.89694	54,200	6/13	2.4	<10	3
at Peru	40.74306	-86.09583	14,000	6/12	1.4	<10	1.4
White River at Newberry	38.92750	-87.01139	19,000	6/20	1.1	<10	1.5
at Spencer	39.28083	-86.76222	Gage Ht. = 19 ft	6/18	1.7	..	1.5
at Noblesville	40.04722	-86.01667	8,600	6/12	1.5	<10	1.5
E. Fork White River at Shoals	38.66722	-86.79222	24,000	5/28	1.2	<10	1.2
Mill Creek near Cataract	39.43333	-86.76333	3,400	6/01	1.2	..	1.2
Wildcat Creek nr. Lafayette	40.44056	-86.82917	16,800	6/12	5.0	<10	5
S. Fork Wildcat Creek nr. Lafayette	40.41778	-86.76806	10,200	6/11	7.9	13	13
Eel River							

## Average recurrence intervals for May-June 2004 floods in Indiana

Stream and Station			Peak discharge (ft <sup>3</sup> /sec) 1	Date	Average recurrence interval, in years		
Name	Lat.	Long.			Ranking 2	Curve 3	Use
nr. Logansport	40.78194	-86.26389	9,100	6/15	3.2	<10	3
Mid. Fork Anderson River at Bristow	38.13889	-86.72111	1,100	5/26	1.7	...	1.7
Buck Creek nr New Middletown	38.12028	-86.08806	6,400	5/28	3.6	...	4
Whiskey Run at Marengo	38.37556	-86.34472	about 1050 5	5/28	3.0	<10	3
Blue River near White Cloud at Fredericksburg	38.43389	-86.19167	>16,000		..	..	150
	38.43389	-86.19167	24,000	5/28	18.5	>100	200
West Fork Blue River at Salem	38.60528	-86.09444	6,900	5/27	17.5	...	100
Silver Creek nr Sellersburg	38.37083	-85.72639	8,800	5/28	5.7	<10	6

FEMA, E A Prych, 5 July 2003

- 1 Discharge from the web, USGS real-time data (subject to revision)
- 2 Recurrence interval from ranking annual peak discharges available on the web; USGS.
- 3 Recurrence interval from curves in report on web;  
[www.state.in.us/dnr/water/surface\\_water/coordinated\\_discharges/index.html](http://www.state.in.us/dnr/water/surface_water/coordinated_discharges/index.html)
- 4 Discharge and recurrence interval from M.S. Griffin (USGS, 7/2/2004 e-mail)

## Average recurrence intervals for May-June 2004 floods in Indiana

Stream and Station			Peak discharge (ft <sup>3</sup> /sec) 1	Date	Average recurrence interval, in years		
Name	Lat.	Long.			Ranking 2	Curve 3	Use

5 Discharge from observed gage height (7.1ft) and rating curve from annual peaks 1987-1993

### **3.4 Assessing Vulnerability of State Facilities**

The vulnerability assessment to state facilities is dependant upon the catalogue of state facilities and land holdings, their location, and their value (Outside of roads, bridges, equipment, etc.). In the process of developing the risk assessment, IDHS realized that data did not exist in a format that would be easily accessed, and that could be used to determine the vulnerability. At the same time several agencies and the Department of Administration began to realize that this information was not readily available.

Department of Administration Land Office, C-TASC, the Polis Center, GIS Commission and IDHS are currently in the process of digitizing information and converting it into a GIS compatible files. This will make it possible for all state agencies to have access to the information they need on a real time basis.

### **3.5 Estimating Potential Losses by Jurisdiction**

Mitigation division in order to determine the potential losses by local jurisdiction used HAZUS MH for earthquakes. The results are based on a level 1 run and are contained in Appendix I.

IDHS and the Polis Center are working on the flood estimation of potential losses using HAZUS. The State anticipates that this information for flooding, tornadoes, winds, winter storms, etc. will be included in the States Enhanced Plan. IDHS received a PDM Grant to develop this information. The state and local governments will continue to assess the vulnerability of critical facilities as more and more communities complete their mitigation plans.

### **3.6 Estimating Potential Losses of State Facilities**

The mitigation division will work with the IDNR division of water to complete an assessment of the state facilities at risk for flood damage, INDOT to assess infrastructure such as roads, bridges, etc to earthquake. Most of the state facilities especially those that are housed in leased office space are equally susceptible to tornado, wind and winter storm.

## 4.0 MITIGATION STRATEGY

### 4.1 Hazard Mitigation Goals

The following Multi-Hazard mitigation goals objectives are IDHS'S response to its legal responsibility in fulfilling natural and man-made hazard mitigation planning. The intent of this plan is to introduce and examine hazard mitigation ideas and recommendations. IDHS is also committed to seeking funds to fulfill the plan's recommendations and to reduce or eliminate loss of life and economic damages in future disasters. Successful implementation of this plan should reduce the threat of specific hazards by limiting the damage and loss they inflict. This Mitigation Plan reflects a commitment on the part of the state to improve its overall emergency management operations to prevent a recurrence of the damages and losses experienced during this decade.

The fundamental mission in hazard mitigation is to safeguard the health, safety, and life of individuals and protect private and public property. The objectives stated below are the methods of implementation for some basic hazard mitigation goals. Important goals for the state include:

- enabling residents to take action for themselves by arming them with information that will help protect them in a disaster
- enabling communities to prepare for future disasters through building awareness of the need to incorporate hazard mitigation plans and programs into community plans, to exercise teamwork of community, state, and local entities in hazard mitigation planning
- to provide training of for those who would work to implement hazard mitigation in the community

For the purpose of simplicity the Mitigation Measures and Funding sources for each measure are summarized with in the text box for every goal and project. In doing so, each project to accomplish the State's mitigation goals, and objectives have possible funding source identified. The Projects are organized whenever applicable or possible on a hazard basis to make the State's priorities for each significant hazard easily identified. Projects identified will expand as more communities develop their local plans thereby identifying their priorities and objectives.

Although this plan deals primarily with projects to be funded under the federal government through FEMA and other disaster agencies, the mitigation division is cognizant of the funding available through the private sector. State staff encourages locals to look for private grant funding and partnerships with local industry and businesses. In the past, locals have worked with lending institutions

to provide low or discounted loans to do mitigation projects on individual structures. The mitigation division will continue to develop private resources for funding of projects through grants and endowment funds. The Eli Lilly Endowment Fund has long been a contributor to local projects.

## **GOAL #1**

**Project:** Develop an effective public awareness program for the natural hazards that Indiana is most likely to experience.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, USFWS, USACE, FEMA

**Possible Funding Sources:** IDHS

**Timeline:** 1 year

## **OBJECTIVE**

Develop a Mitigation category on the Indiana Department of Homeland Security web site, featuring a “Hazard of the Quarter” detailing mitigation strategy for local communities and the general public. Work with local emergency management to investigate other avenues to educate the public.

## **GOAL #2**

**Project:** Promote economic development consistent with floodplain management, earthquake, and tornado guidelines.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, USFWS, USACE, FEMA, EDA, IDNR, NOAA, NWS, USGS, State HUD agency

**Possible Funding Sources:** HUD, Indiana Housing & Finance Authority, Indiana Dept. Of Commerce

**Timeline:** Ongoing

## **OBJECTIVE**

Work with local emergency management, mayors, city managers, county officials, and the Indiana chapter of the APA to educate planning officials on the need to develop and adopt a community master plan that includes disaster mitigation planning principles, flood reduction program, and a public awareness program that advises a community of the hazards that affect their community and the need to mitigate them.

### GOAL #3

**Project:** Use Pre-Disaster Mitigation program to promote recognition of the value of hazard mitigation to public safety and the welfare of the population.  
**Lead Agency:** IDHS  
**Coordinating Agencies:** Local Emergency Management, USFWS, USACE, FEMA, HUD  
**Possible Funding Sources:** PDM & PDMC  
**Timeline:** 2 years

#### OBJECTIVE

Use The Pre-Disaster Mitigation program as a way of promoting the recognition of communities that have instituted successful mitigation plans and programs in order to promote duplication of these successful programs in other communities in the state. Establish uniform application and formalized selection criteria for nominating candidates for Pre-Disaster Mitigation program selection. Tie this project to goals 1 & 2, integrating Pre-Disaster Mitigation program where possible into strategies for public awareness of natural and man-made hazards and promotion of economic development consistent with natural hazard guidelines.

### GOAL #4

**Project:** Encourage scientific study of natural hazards and the development of data to support mitigation strategies for those hazards that are a threat to Indiana.  
**Lead Agency:** IDHS  
**Coordinating Agencies:** IDNR, Indiana Geological Survey, USGS, CUSEC, NWS, USACE  
**Possible Funding Sources:** IDHS, HMTAP, HMGP, local sources  
**Timeline:** Ongoing

#### OBJECTIVE

Continue undertaking hydrological studies of floodplain areas, especially in smaller watersheds as part of the process of developing flood mitigation plans. Work with Indiana Geological Survey and CUSEC to identify and map faults and historical epicenters in the state. Work with the NWS to identify repetitive areas and vulnerability of communities to flooding and other weather hazards.

## GOAL #5

**Project:** Develop a program to identify needs for monitoring systems (dam structure, river levels, weather conditions and provide a plan of action to protect communities or individuals from hazards.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local emergency management, NWS, IDNR, USGS, Indiana Geological Survey

**Possible Funding Sources:** HMGP, local sources

**Timeline:** Ongoing

### OBJECTIVE

Encourage agencies to identify areas that are lacking monitoring capabilities. Work with local emergency management and National Weather Service to help formulate a plan of action to meet these needs. And continue to work with IDNR to develop emergency action plans for high hazard dams.

## GOAL #6

**Project:** Maintain an effective State Hazard Mitigation Council that will facilitate implementation of the Indiana Hazard Mitigation Plan, and recommend modifications to the Governor through the GAR (Governor's Authorized Representative).

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, USFWS, USACE, FEMA, and state agencies.

**Possible Funding Sources:** IDHS

**Timeline:** ongoing

### OBJECTIVE

Establish an ongoing State Hazard Mitigation Team, and develop a process for identifying the team members and their interests, authorities, and policies for mitigation, and how we can use them to achieve our mitigation goals. Identify the training needs for the members of the team to equalize understanding of mitigation goals and programs in order to assure its overall effectiveness. Work with other agencies to identify current and future mitigation goals and objectives. The State Hazard Mitigation Team has been proposed, drafted, and approved by IDHS, and is awaiting the Governor's approval by Executive Order.



## GOAL #7

**Project:** Identify mitigation opportunities for long-range planning considerations.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, USACE, FEMA, State Historic Preservation Officer, community planners, building & zoning officials

**Possible Funding Sources:** IDHS

**Timeline:** Ongoing

### OBJECTIVE

Work with local emergency management to identify known mitigation opportunities, and to investigate resources in the community. Establish a process for tracking both the mitigation opportunities and the resources available to the communities.

## GOAL #8

**Project:** Conduct workshops to support for local mitigation planning.

**Lead Agency:** IDHS

**Coordinating Agencies:** Public Safety Training Institute (PSTI), Local Emergency Management, FEMA, state chapter APA

**Possible Funding Sources:** FMA, IDHS, PDM, & PDMC

**Timeline:** ongoing

### OBJECTIVE

Work with local emergency management and PSTI to develop and provide workshops at the local level to assist communities in developing pre-disaster hazard mitigation plans. At the end of the workshop, participants will be equipped with a flood mitigation plan, which will provide the foundation for developing an all hazard plan for the community.

## GOAL #9

**Project:** Encourage adoption of building and zoning codes that support floodplain management, earthquake, and tornado objectives in all counties of the state.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, USFWS, USACE, FEMA, Indiana Geological Survey, IDNR, Indiana Building Commission

**Possible Funding Sources:**

**Timeline:** 2 – 3 years

## OBJECTIVE

Work with legislature to pass the International Building Code (IBC), superceding the present Uniform Building Code. Work with legislators by providing information and support for the need to adopt the stricter code. Once passed, encourage adoption of the IBC. Where applicable, encourage locals to adopt and implement the IBC, by providing information, assisting in getting local building services inspectors on board to encourage it, and spur its incorporation into local land use and development plans. Help the community explore ways to get builders to adopt the requirements of the code.

## GOAL #10

**Project:** Identify critical and government facilities. Determine methods of protection in hazard prone areas, including relocation, flood proofing, earthquake/wind retrofit, back-up systems.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management and land use officials, local governmental entities.

**Possible Funding Sources:** IDHS, local funding

**Timeline:** Ongoing

## OBJECTIVE

Coordinate with local emergency management and building officials in the identification of critical facilities that are vulnerable to any hazard, and formulate a plan to relocate or retrofit those facilities, and to make sure that these facilities are insured. Identify unmet needs in the form of back-up power systems, and alternative sources of services in the event of a disaster affecting these facilities.

## GOAL #11

**Project:** Develop a state-wide hazard mitigation training program for local government officials, i.e. building inspectors, community planners and public works, state agencies, and construction professionals (contractors, architects, designers).

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, other local government officials, IDNR, FEMA

**Possible Funding Sources:** IDHS, FEMA

**Timeline:** 2 years

## OBJECTIVE

Work with local government officials and IDNR to determine training needs of local government officials who are involved in overseeing the community's development, infrastructure, etc. Educational funding would be used to train engineers, architects and building contractors on disaster resistant construction and pre- and post-earthquake building evaluation. Provide opportunities for local officials to attend ATC-21 (Rapid Seismic Evaluation of Buildings) seminars by hosting the training or providing information on training venues. Also, investigate opportunities for training in other hazards.

## GOAL #12

**Project:** The State has set a task under "All Hazards" for warning systems for all hazards. The warnings for floods and the education of the public will be part of this task.

**Lead Agency:** IDHS

**Coordinating Agencies:** Local Emergency Management, other local government officials, IDNR, FEMA

**Possible Funding Sources:** IDHS, FEMA

**Timeline:** 2 years

## OBJECTIVE

Work with the local emergency management and IDNR to identify areas and locations where warning systems are needed and would best be served by a warning system. Develop a public information and awareness program to address the hazards and the need for public action to prepare, plan and respond to these hazards.

## 4.2 State and Local Capabilities

Historically, in Indiana, the state or local capability to carry out the mitigation measures to achieve the goals and objectives that are identified in this plan and local mitigation plans have been a political decision. These decisions are driven by the environment existing at any given time. Ideally, the political forces should be committed to the principles of mitigation, willing to commit the time and financial responsibilities in the short run to benefit in the long run. Only measures that as a result of major, unexpected events get the focus of the community are changed as a result of short term projects.

Capability is for the most part economically driven. As the economy prospers so does mitigation. As the economy slows, and resources in all levels government must be stretched and allotted carefully to assure that essential services will be maintained, spending on mitigation will be reduced. The political will of the party

in power has, does and will continue to influence the state's or local jurisdiction's ability to accomplish mitigation.

Indiana in recent years (like many states) has been reactive rather than proactive when it comes to mitigation. For years, it was neglected. Funding was available from outside sources and state sources only in reaction to significant events which impacted the health and safety of its residents. In order for a mitigation measure to be implemented it had to be relatively painless and require little or no economic commitment from the General Fund. That is not to say, that the state is resistant to mitigation. Indiana has one of the most strict flood control acts in the country. Considering that Hoosiers have vigilantly preserved their home rule form of government, this is a significant achievement. In fact, the flood control act precedes the National Flood Insurance Act.

As the result of the 1937 flood along the Ohio River, Indiana relocated portions of Leavenworth and Madison to protect the citizens from flooding. This was accomplished while the state and the nation were still recovering from the Great Depression. The state legislature enacted the Indiana Flood Control Act with the hope that this would reduce the likelihood of another flood. They may not have been able to hold back the water (that would come later), but if they restricted the number of homes built along the river, another flood would have less impact.

With few major presidentially declared disasters over the last half of the 1990's the state has continued to implement the measures identified to achieve its enumerated goals and objectives. This is due in part to local communities or individuals that have pursued mitigation with a religious fervor. Relying on state, local or private resources to reduce the threat to life and safety associated with the risk that comes from natural hazards or human affected causes, these efforts have been piecemeal at times but effective. The Town of English was relocated during this time period. Since the relocation, the county has had several flood events that resulted in water levels in excess of four feet in the "old town" area with no or little damage.

If the state or the locals will see mitigation as a long term goal and as a process rather than a project, mitigation need not be thrown off track by changes in the economic or the political climate. To this end, many of the measures identified are designated as on going. Mitigation, when done properly, can assist a society to grow and prosper.

Evansville and Vanderburgh and surrounding counties have actively pursued changes in their and the State's building codes to assure tighter seismic control on buildings. They have retrofitted fire stations, hospitals, nursing homes and encouraged individuals to make their residences earthquake safe. During this time they experienced no significant earthquakes. They have experienced some that registered between 4.3 and 5.1 on the Richter scale.

As long as there is a real or perceived threat, the state and local jurisdictions will do what needs to be done in order to reduce the economic impact of disaster events.

#### ***4.2.1 Pre- and Post-Disaster Programs***

The State of Indiana emphasized reduction of adverse effects from hazard events and promotes programs to achieve this objective. This section includes matrices that outline the State's pre- and post-disaster programs that promote mitigation objectives. IDHS utilized a revised form from FEMA 386-3 (part of the mitigation planning series) to assist in the determination of specific mitigation capabilities of Indiana's Departments and Agencies and identify the programs that support, facilitate, or hinder the mitigation process. The Comments column provides further description and evaluation of the programs and policies.

Definitions:

- Support loss reduction – Programs, plans, policies, regulations, funding or practices that help implement mitigation measures.
- Facilitate loss reduction – Programs, plans, policies, etc. that make implementing mitigation measures easier.
- Hinder loss reduction – Programs, Plans, policies, etc., that pose obstacles to implementing mitigation measures.

#### ***Office of the Governor***

##### Agency Mission/Function:

Under Indiana Law, the Governor is responsible for the Coordination of all Indiana's emergency/disaster management system including mitigation programs.

Table 4.2.1.a  
Office of the Governor Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Disaster Assistance Appropriations (Post-Disaster)	X			The Governor can request appropriations from the General Assembly for disaster assistance whenever he/she deems it is necessary for the protection of all citizens. The Authority of an Executive Order can establish and require that the state, its agencies and departments and local communities adopt mitigation
Executive Order for the Adoption of Mitigation strategies (Pre- and Post-Disaster)		X		The Authority of an Executive Order can establish and require that the state, its agencies and departments and local communities adopt mitigation strategies, and principles as part of their governing or regulatory functions.

### ***Indiana Department of Homeland Security Agency (IDHS)***

#### **Agency Mission/Function:**

IDHS serves as administrator and coordinator of the State's mitigation projects that have been funded by the Federal government through FEMA under the Robert T. Stafford Act, Public Law 93-288. IDHS coordinates all situation and damage assessment operations in a disaster area. The agency routinely cooperates with federal, state and local governments to maintain and develop disaster preparedness, response, recovery and mitigation Plans. IDHS establishes and maintains an EOC to provide coordination and public information during emergencies and disasters.

The State Hazard Mitigation Officer serves as a member of the Indiana State Hazard Mitigation Council (ISHMC). The ISHMC identifies mitigation projects, evaluates hazards and prioritizes projects for funding. IDHS coordinates with several state agencies to select and implement HMGP projects.

Table 4.2.1.b  
Indiana Department of Homeland Security Agency Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Manages the State Hazard Mitigation Program (Pre- and Post-Disaster)	X			The mitigation staff's purpose is to promote mitigation statewide and to manage the FEMA mitigation Programs for Indiana.
Hazard Mitigation Grant Program (HMGP) (Post-Disaster)	X			IDHS administers this program, which is available after a Presidential Disaster Declaration. HMGP funds hazard mitigation plans and cost-effective projects that reduce or eliminate the effects of hazards and/or vulnerability to future disaster damage.
Pre-Disaster Mitigation Grant Program (PDM) (Pre-Disaster)	X			IDHS administers funds from this annual, national competitive program. PDM funds hazard mitigation plans and cost-effective projects that reduce or eliminate the effects of hazards and /or vulnerability to future disaster damage.
Flood Mitigation Assistance Program (FMA) (Pre- and Post-Disaster)	X			IDHS administers this program, which funds flood mitigation plans, provides technical assistance and funds construction projects that reduce flood risk to insured, repetitive loss properties.
Encourages and promotes jurisdiction participation in NFIP. (Pre-and Post-Disaster)	X			IDHS requires good standing in the NFIP as a prerequisite to mitigation funding.
Education and Outreach (Pre- and Post-Disaster)		X		Mitigation Staff promotes pre- and post-disaster mitigation techniques, including retrofitting, NFIP, floodproofing, and construction of saferooms, is imperative for prevention of damage from future events.

**Indiana Department of Transportation (INDOT)**

Agency Mission/Function:

INDOT's mission is to provide the best transportation system that enhances mobility, stimulates economic growth, and integrates safety, efficiency and environmental sensitivity. Construction and Maintenance of the major state and federal highways and interstates and related infrastructures within the State is the primary focus.

Table 4.2.1.c  
Indiana Department of Transportation Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Engineering and Design Practices (Pre- and Post-Disaster)	X			Provides technical assistance for relocation of critical facilities, relocation of bridges and upgrading of culverts.
Disaster Recovery and Repair (Post-Disaster)		X		Clear and repairs roadways interrupted by flooding, tornados and landslides. Promotes and utilizes mitigation measures throughout engineering and design process to prevent future damage.
Education and Outreach (Pre-and Post-Disaster)	X			The INDOT provides information to citizens on safety and prevention techniques and promotes severe weather awareness.

**Indiana Department of Natural Resources (IDNR)**

Agency Mission/Function:

The mission of the Indiana Department of Natural Resources is to protect, enhance, preserve, and wisely use natural, cultural, and recreational resources for the benefit of Indiana's citizens through professional leadership, management, and education. To satisfy such a broad and diverse responsibility, the Department is divided into two distinct areas of responsibility: the Regulatory Management Team; and, the Land Management Team. The Regulatory Management Team consists of the Divisions of Water; Entomology and Plant Pathology; Soil Conservation; Historic Preservation and Archeology; Reclamation; and Oil and Gas. Outdoor recreation and land management programs are housed within the Land Management Team. That unit consists of



State Parks and Reservoirs; Nature Preserves; Land Acquisition; Fish and Wildlife; Outdoor Recreation and Forestry.

The IDNR regulates the state's rivers, streams, reservoirs, lakes and floodplains. Administers and enforces the National Flood Insurance Program regulations and State Floodplain regulations. The Department also advises local communities regarding enforcement of their floodplain ordinances.

Table 4.2.1.d  
Indiana Department of Natural Resources Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Floodplain Management Program (in accordance with IC 14-28-1 Flood Control Act and IC 14-28-3 Floodplain Management Act) (Pre- and Post-Disaster)	X			IDNR, Division of Water coordinates with the NFIP; monitors compliance with state and local floodplain management standards; provides assistance in mitigation planning and identifies flood hazards
Indiana Dam Safety Program (IC 14-27-7 Dams, Dikes and Levees Regulation Act) (Pre- and Post-Disaster)	X			Inspection, enforcement and permitting programs for dam and levees, classifies hazards and develops standards for dams and levees.
Conducts Hydrological Studies (Pre-Disaster)		X		Maintains records of lake, stream and river levels necessary for proper identification of flooding hazards. Cooperates in USGS data-collection programs. Currently, more than 80 percent of the continuous hydrologic data-collection activity is maintained through efforts cooperatively funded by the IDNR and the USGS.
Protects Threatened or Endangered Species (Pre- and Post-Disaster)			X	Coordination early in project development determines potential effects on threatened or endangered species. Also coordinates with US Fish and Wildlife.

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Indiana Historic Preservation Office (in accordance with Section 106 of the National Historic Preservation Act) (Pre- and Post-Disaster)			X	FEMA, in coordination with the State Historic Preservation Officer, ensures that the effects a proposed project may have on any district, site, building, structure or object that is included in or eligible for inclusion in the National Register of Historic Places. If there are adverse effects, FEMA enters into consultation with the SHPO to avoid or mitigate effects to cultural resources and develop a project-specific agreement to identify the measures to mitigate the effects.

### ***Indiana Geological Survey***

#### Agency Mission/Function:

The Indiana Geological Survey provides services to the State of Indiana that contributes to the wise stewardship of its citizenry through the gathering and interpretation of relevant geological information. A member of the Association of Central United States Earthquake Consortium and the Mitigation Planning Subcommittee.

Table 4.2.1.e  
Indiana Geological Survey Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Consultation on geologic features and soil types, subsidence and slope stability. (Pre- and Post-Disaster)		X		Carried out through a combination of the following activities: geologic sample and data collection and storage, information dissemination (in the form of published maps, reports and databases), educational outreach programs, focused research initiatives and cooperative investigations with governmental agencies, industries and educational organizations.

### ***Indiana Department of Environmental Management (IDEM)***

Agency Function/Mission:

The Indiana Department of Environmental Management utilizes Federal Environmental Protection Agency funding for the construction and upgrading of water and waste treatment facilities. A member of the Indiana State Hazard Mitigation Committee.

Table 4.2.1.f  
Indiana Department of Environmental Management Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Consultation (Pre- and Post-Disaster)	X			Identifies disaster and environmental concerns and issues surrounding mitigation projects.
Technical Assistance (Pre- and Post-Disaster)		X		Provides technical assistance concerning Superfund sites. Incorporates mitigation objectives whenever possible.

***Indiana State Department of Health***

Agency Function/Mission:

The Indiana State Department of Health serves to promote, protect, and provide for the public health of people in Indiana. A member of the Indiana State Hazard Mitigation Committee.

Table 4.2.1.g  
Indiana State Department of Health Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
The Indiana State Department of Health identifies and monitors issues that may affect the public health within the area of a disaster, i.e. well contamination, disease and vector control. (Pre- and Post-Disaster)		X		Promote integration of public health and health care policy; strengthen partnerships with local health departments, collaborate with hospitals, providers, governmental agencies, businesses, insurance, industry, and other health care entities; and support locally-based responsibility for the health of the community.

## ***Indiana Department of Commerce***

### Agency Function/Mission:

The state of Indiana wants to help communities improve. It does so by providing savings plans, tax credits, and a variety of programs to assist with public infrastructure. Community Development Division helps cities, towns and counties continue to improve. It does this in a variety of ways, including grants to assist with public infrastructure or childcare accessibility, matching savings accounts for low-income Hoosiers, and tax credits that support non-profit organizations. A member of the Indiana State Hazard Mitigation Committee.

Table 4.2.1.h  
Indiana Department of Commerce Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Provides funding under the Community Development Block Grant Program and Economic Development Program for infrastructure construction/improvement and commercial property acquisition/relocation in designated mitigation projects. (Pre- and Post-Disaster)	X			Can supply matching funds to communities for acquisition/elevation projects under the Community Development Block Grant (CDBG) program. Provides technical assistance to communities through EDA programs.

## ***Indiana Housing Finance Authority (IHFA)***

### Agency Function/Mission:

IHFA administers financial vehicles and incentives to create affordable housing for rent or purchase as well as supportive facilities. A member of the Indiana State Hazard Mitigation Committee.

Table 4.2.1.i  
Indiana Housing Finance Authority Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Funding for construction of housing through its low to moderate income housing, senior citizen housing, etc. (Pre-and Post-Disaster)		X		Provides funding for relocation of floodplain residents through purchase of new housing.

### ***Indiana General Assembly***

Agency Function/Mission: The General Assembly is responsible for the drafting and enacting laws that govern the state and the residents of the state. Additionally, they develop and fund laws, programs and projects which guide the operation of the state.

Table 4.2.1.j  
Indiana General Assembly Mitigation Summary

Programs, Plans, Policies, Regulations, Funding, or Practices	Effect on Loss Reduction (X)			Comments
	Support	Facilitate	Hinder	
Enactment of the Indiana Flood Control Act.		X		Restricted the development of floodplain property within the state for both residential and governmental structures. Commercial structures are restricted to a lesser extent.
Indiana Disaster Trust Fund.	X			The fund provides a method to fund disaster recovery and mitigation activities, but is not funded on an annual basis. Funding has only been allotted once since its inception and that was for the repair of local roads from flash flooding.
Responsible for writing, enacting and funding laws to require that mitigation principles are met and programs funded. (Pre-and Post-Disaster)		X		Funding of state disaster assistance to local communities and state agencies. Under the funding authority, they can assist communities that are unable to meet the matching requirements of the federal grant program.

## **Federal Emergency Management Agency (FEMA)**

### Agency Function/Mission:

The Federal Emergency Management Agency's mission is to lead and support various elements of society in responding to and recovering from disasters rather than be responsible for protecting institutions and reducing the loss of lives and property.

Table 4.2.1.k  
Federal Emergency Management Agency Mitigation Summary

<b>Programs, Plans, Policies, Regulations, Funding, or Practices</b>	<b>Effect on Loss Reduction (X)</b>			<b>Comments</b>
	<b>Support</b>	<b>Facilitate</b>	<b>Hinder</b>	
Administers and coordinates a variety of disaster and emergency management programs and funding programs available under the Stafford Act and the Earthquake Hazards Reduction Act	<b>X</b>			Provides a federal 75% match Hazard Mitigation Grant Program, for community hazard mitigation projects. Assist communities and their citizens to recover from Presidential declared disasters and works to prevent future disasters.
Administers and coordinates the National Flood Insurance Program and its funding of mitigation projects and programs.	<b>X</b>			Provides technical assistance to the State and communities toward the implementation of these projects. Undertakes eligibility, benefit/cost, and environmental reviews of Hazard Mitigation projects. Under the NFIP, mitigation resources to the community also include FMA, PDM-C, and CRS.

### **4.2.2 Policies Regulating Development**

Regulation of development in hazard prone areas is imperative. There are several policies, which perform this function in an effort to prevent future damage or reduce the risk of damage in already developed areas. Indiana is designated as a "home rule" state (IC 36-1). Counties, municipalities, and townships are granted all the powers they need for the effective governing of local affairs. This results in a lack of uniformity from one jurisdiction to the next. Home Rule gives municipal jurisdictions the power to govern themselves in local municipal matters independent of state laws. When a state law and a local ordinance govern the same activity, the ordinance yields to state law.

Table 4.2.2.a

## Policies that Regulate Development in Hazard-prone Areas

<b>Policy Area</b>	<b>Description/Applicability</b>	<b>Effectiveness</b>
Floodplain Management	IDNR, Division of Water coordinates with the NFIP; monitors compliance with state and local floodplain management standards; provides assistance in mitigation planning and techniques; identifies flood hazards. Pre- and Post Disaster local jurisdictions are required to comply with floodplain requirements regarding development in hazard prone areas. The requirements include provisions for building and rebuilding in floodplains.	The Program outlines strict policies for new development in high-risk, hazard-prone areas. Structures must be elevated two (2) foot above the Base Flood Elevation of the floodplain. The local floodplain managers have reduced the number of damaged structures in hazard events through permitting and promotion of mitigation alternatives.
Coastal Erosion Management	The purpose of the Indiana Lake Michigan Coastal Program is to enhance the state's role in planning for and managing natural and cultural resources in the coastal region and to support partnerships between federal, state and local agencies and organizations. The Indiana Lake Michigan Coastal Program relies upon existing laws and programs as the basis for achieving its purpose. There are 3 coastal counties in Indiana.	Coastal grant programs are available to local jurisdictions. The NFIP has not mapped flood areas along coastlines, but it has been estimated that 25 percent of homes and other structures within 500 feet of the U.S. coastline and the shorelines of the Great Lakes will fall victim to the effects of erosion within the next 60 years.
Zoning	Zoning is a locally enacted law that regulates and controls the development and land use of private property. It prevents development in inappropriate places (e.g., flood plains, steep ravines, lands with underground caves, etc...) and by regulating the use of land to protect flood prone areas.	The State continues to promote the importance of zoning as an effective method to minimize damage and encourages local jurisdictions to adopt zoning ordinances. Zoning is still a voluntary program, and continues to meet resistance in smaller, rural communities.

Policy Area	Description/Applicability	Effectiveness
Land-Use Planning	The land use plan lays out land development goals and priorities. The plan details how specific parcels of property will be used, allowing safe and coordinated development. Land use plans take into consideration the hazards associated with any give area in a jurisdiction.	Some Indiana Residents consider land use planning an encroachment on their personal property, but the process allows jurisdictions to identify site-specific hazards and avoid development that places people or property in harms way. Still found mostly in larger cities and to some extent as economic development plans in smaller communities.

### 4.3 Mitigation Measures and Funding Sources

The following are hazard-specific mitigation measures developed by the Indiana Hazard Mitigation Council. All projects were developed with the state's overall mitigation strategy to safeguard the health, safety, and life of individuals and protect private and public property. Each identified measure also includes funding sources, the agency which would serve as lead agency and a possible timeline. All of these timelines are subject to funding sources being available and budgetary restrictions.

#### 4.3.1 All Hazards

***Project 1: Collect and quantify the local data from mitigation plans as they are developed, and risk assessments from other local planning efforts into data that is in a standard format to make them useable. (Data will include assessment of risk and vulnerability, loss estimates, capability assessment and mitigation actions and projects.)***

***Lead Agency: IDHS***

***Coordinating Agencies: County Emergency Mgmt. & Planning offices,***

***Possible Funding Sources: FEMA, Department of Homeland Security***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Within every county in the state there are several planning initiatives that require at least a portion of a risk assessment that can be adapted to meet the mitigation requirements. The state's online mitigationplan.com will allow the state to collect the data from all of the local plans as they are completed. The state requires that all counties that receive funding for planning include their data in the online system. This will allow the data to be easily incorporated into the state's mitigation plan to develop



a more comprehensive state risk assessment. Additionally, it will identify the mitigation actions to be incorporated into the next revisions of the plan.

***Project 2: Complete the state's risk assessment with the Polis Center.***

**Using Polis Center data, the Indiana Department of Homeland Security will estimate the dollar losses for state facilities at risk.**

***Lead Agency: IDHS***

***Coordinating Agencies: Indiana University, Purdue University, National Weather Service, Regional Planning Commissions, Indiana Geological Survey, Department of Administration, INDOT, IDNR, IDEM,***

***Possible Funding Sources: FEMA, Department of Homeland Security***

***Timeline: one year***

**How Project Contributes to Mitigation Strategy:** In completing the risk assessment, the state will be able to assess the risk to state facilities and infrastructure. State received a grant for PDM-C for fiscal year 2003 to complete a hazard analysis and risk assessment. The Department of Administration, land office has been mapping the state facilities. The Polis Center will run Hazus models for flooding and earthquake to assess the vulnerability with improved data where available. The mitigation division and the Polis Center will work with the other agency to complete the analysis for the other hazards to complete the enhanced plan. This will allow the state to quantify the dollar value of state facilities at risk, and estimate potential dollar losses.

#### **4.3.2 Flooding**

The major goal for this hazard is to protect the lives and properties of residents at risk, and to protect critical facilities. The major remedy for this type of disaster is prevention, by moving or elevating residences out of the floodplain and floodway. This not only protects people, but also stops the escalating cost of repetitive damage. The foundation for this remedy is the community's hazard mitigation plan and its commitment to adhere to the requirements of the National Flood Insurance Program.

***Project 3 : Develop a strategy to ensure community's participation in the National Flood Insurance Program (NFIP), and its compliance with NFIP regulations. Encourage the community's adoption of a floodplain management plan, and participation in the Community Rating System (CRS).***

***Lead Agency: IDNR***

***Coordinating Agencies: County Emergency Mgmt. & Planning offices, IDHS, FEMA's National Flood Insurance Program.***

***Possible Funding Sources: FEMA***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Build on existing strategy so that IDHS and IDNR have a coordinated program through the local emergency management programs and floodplain officials. Specifically, staff will target communities that are not participating in the NFIP that have identified flood hazards for outreach. Work with locals on a compliance strategy. The adoption of a local flood ordinance is the first step to reduce future damages from flooding.

***Project 4: Encourage communities to upgrade stormwater runoff systems, and to integrate adequate stormwater retention and control in new construction projects.***

***Lead Agency: Local drainage boards***

***Coordinating Agencies: County Emergency Mgmt. & Planning offices, local public work and highway depts., Local watershed districts, U.S. Army Corps of Engineers, IDHS***

***Project Timelines; Ongoing***

**How Project Contributes to Mitigation Strategy:** Building an outreach and to locals and a network for public awareness by using the resources of the Association of Floodplain & Stormwater Management (ASFPM) to raise awareness in communities on the need to develop stormwater retention as a means of controlling runoff from large developments or development projects. Work with local drainage boards to improve local codes regarding drainage systems. Identify known areas where improved stormwater systems would reduce or eliminate flooding.

***Project 5: Encourage and create awareness of acquisition/elevation projects in communities, as a hazard mitigation component of their community plans.***

***Lead Agency: County emergency management***

***Coordinating Agencies: IDHS, County Planning offices, Local watershed districts, U.S. Army Corps of Engineers. FEMA, NWS***

***Possible Funding Sources: IDHS, FEMA***

***Timeline: 3 years***

**How Project Contributes to Mitigation Strategy:** Identify potential projects and develop local interest in loss reduction through acquisition. In communities where there are identified acquisition/elevation projects, develop and implement a Flood Awareness Week. This would entail the use of local media, schools, and commercial outlets to promote and inform communities of existing vulnerability and possible solutions to flooding problems. Create an awareness specifically of FEMA's acquisition/elevation/relocation program. Encourage local emergency management to continue the public awareness campaign throughout the year.

***Project 6: Identify statewide all critical facilities that remain in flood prone areas (100 yr. Flood). Create a strategy to target these facilities, and ensure that they have flood insurance until relocated out of the floodplain.***

***Lead Agency: IDHS***

***Coordinating Agencies: County Emergency Mgmt. & Planning offices, FEMA NFIP***

***Possible Funding Sources: IDHS, local and private sources***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Improve the state's risk assessment by identifying and mapping the state owned facilities. This includes such critical facilities as fire and police stations, schools, hospitals, oil & gas storage, sewage treatment facilities, and electrical/telephone switching facilities. Explore funding mechanisms through federal and state agencies to encourage communities and private service providers to relocate replacement facilities outside of flood hazard areas. Encourage communities to incorporate flood protection and mitigation of critical facilities in their long-range development plan.

***Project 7: Create public awareness of wet and dry flood proofing techniques.***

***Lead Agency: IDHS***

***Coordinating Agencies: County Emergency Mgmt. & Planning offices, FEMA, IDNR, state associations***

***Possible Funding Sources: Pre-Disaster Mitigation program***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Encourage individual mitigation projects to reduce losses from low depth flooding. Work with County emergency management using home improvement and other commercial retailers to showcase methods and supplies for wet and dry flood proofing of homes which receive low level or basement flooding. Work with County emergency management to explore other methods for reaching the public.

***Project 8: Create master flood hazard risk list by combining repetitive loss lists of structures, including individual assistance and insurance claims.***

***Lead Agency: IDHS***

***Coordinating Agencies: FEMA, IDNR***

***Possible Funding Sources: PDM & PDM-C***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Develop a more comprehensive flood risk and vulnerability assessment and identify future projects with a more accurate vulnerability to flooding. Coordinate with IDNR to develop a current repetitive or multiple loss list of structures throughout the state to include photographic and more detailed records of the structures.

***Project 9: Develop a program to identify need for warning or monitoring systems (dam structure, river levels, weather conditions, and provide a plan of action to protect communities or individuals from hazards.***

***Lead Agency: IDHS***

***Coordinating Agencies: Local emergency management, NWS, IDNR, USGS, Indiana Geological Survey***

***Possible Funding Sources: HMGP, local sources***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Identify populations and areas at risk for catastrophic flooding from dam and levee breaches, and create a public awareness of the risks associated with living near high risk structures and near river and waterways. This project is listed under “All Hazards”, and also applies to flood warning systems. A component of this project is public education.

***Project 10 : Require Dam Owners to develop and maintain Dam Emergency Action Plans which include inundation maps for possible failures. Incorporate inundation map data in the determination of dam failure probability.***

***Lead Agency:*** IDNR- Dam & Levee sections

***Coordinating Agencies:*** Local emergency management, NWS, IDNR, USGS, Indian State Legislature

***Possible Funding Sources:*** HMGP, local sources

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Identify areas at risk for flooding from breaches and increase residents awareness of their risk of flooding. In 2004 legislative session the legislature passed law which not only required the development of Emergency Action Plans for dam owners it also gave IDNR more enforcement powers in the regulation of and prosecution of negligent dam owners. Additionally, the legislation provided for IDNR jurisdiction on all dams when they prove to threaten life and property regardless of size, drainage basin, or retention. However, the law is still to new to have a great impact on the development of plans on other than very large structures at this time. IDNR will continue to monitor progress.

***Project 11: Develop updated Flood plain maps for all counties in Indiana.***

***Lead Agency:*** FEMA

***Coordinating Agencies:*** IDNR, local floodplain management, Congress

***Possible Funding Sources:*** Congressional funding under the Map Modernization

***Timeline:*** 7 Years

**How Project Contributes to Mitigation Strategy:** Improve the state’s ability to assess at risk areas. IDNR with funding from FEMA’s Map Modernization is in

the process of updating and digitizing the floodplain maps for most of the counties in the Indiana. IDNR expects to have the majority of the mapping completed within seven years provided the funding remains intact.

#### **4.3.3 Winter Storms**

The mitigation goal is to protect infrastructure from failing as a result of winter storms; safeguarding the infrastructure will help to minimize the impact of these storms on the community. Revising building codes and burying power lines are effective methods to preserve infrastructure during a winter storm disaster.

A significant part of mitigation is to increase public awareness so they can be prepared. For this hazard, public awareness extends beyond individual preparedness. As indicated by the first project, the public can actually contribute to the well-being of everyone in the community by planting trees in strategic places.

***Project 12: Develop windbreak projects on open stretches of interstate.***

***Lead Agency: INDOT***

***Coordinating Agencies: IDHS, IDNR, FEMA, State Dept. of Agriculture***

***Possible Funding Sources: HMGP, INDOT, private grants***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Reduce the winter weather hazard of blowing and drifting snow by reducing open stretches near the rural sections of the interstate and highway systems. INDOT will coordinate with IDHS to develop these projects. The project will include educating the public, especially encouraging farmers to plant trees along their fields adjacent to roads and elsewhere to form natural snow fences and windbreaks and exercise soil conservation. Guidelines will ensure that these windbreaks are not planted near power lines. Utilize and coordinate this educational activity with State Dept. of Agriculture, IHMT, local emergency management officials. Also, provide this information on State Dept. of Agriculture and IDHS web sites. Work with local emergency management officials to develop workshops. Utilize Pre-Disaster Mitigation program communities.

***Project 13: Overhead to underground utility conversion.***

***Lead Agency: Local Rural Electric Management Cooperatives***

***Coordinating Agencies: IDHS, FEMA, local zoning entities***

***Possible Funding Sources: HMGP, Rural Electric Cooperatives***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Reduce the loss from ice and wind to the power supply system. Following a disaster, encourage utility co-ops to attend the applicant's briefing. Get more commitments from utility co-ops for future projects when funds become available. Work with local community leaders and planning depts. to encourage integration of an underground utility requirement into their community development plans and subdivision codes. Emphasize the strategy for long-term planning, and integral steps at a low cost to the community. Increase awareness of these needs utilizing industry publications, and providing information on Utility Cooperative and IDHS web sites.

***Project 14: Encourage community participation in winter storm mitigation activities.***

***Lead Agency: IDHS***

***Coordinating Agencies: Local utilities, local emergency management***

***Possible Funding Sources: IDHS budget***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Improve the public awareness of the risk and possible mitigation activities for winter storms. Add to IDHS's Mitigation web page a site that encourages hits by individuals as well as community leaders. Work with utilities to encourage customers to do individual mitigation projects such as planting utility line friendly trees, planting tree fences along open fields, especially near roads. Encourage individual preparedness for winter storms, by working through community leaders to establish outlets in the community for preparedness education. Establish links on the State Emergency Web Site with other appropriate web sites serving the community.

***Project 15: Revise building codes to increase snow loading requirements on roofs.***

***Lead Agency: IDHS***

***Coordinating Agencies: State Dept. of Building Services (IDHS), local building officials.***

***Possible Funding Sources: IDHS***

***Timeline: Completed***

**How Project Contributes to Mitigation Strategy:** Reduce the loss to homes, commercial structures and agricultural building from excessive snow loads. The legislature adopted the International Building Code (IBC), superceding the present Uniform Building Code. However, there is still no requirement for a minimum construction standard for residential or industrial structures. The task is to encourage locals to adopt and implement the IBC, by providing information, assisting in getting local building services inspectors on board to encourage it, and spur its incorporation into local land use and development plans. Help the community explore ways to get builders to adopt the requirements of the code.

***Project 16: Public awareness of winter storm warning.***

***Lead Agency: IDHS***

***Coordinating Agencies: Local schools, NWS, Local emergency management***

***Possible Funding Sources: IDHS, Pre-Disaster Mitigation program***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Target schools on what winter storm watches and warning mean, and how to key into community warning systems. What snow emergency ordinances mean to schools and to individuals. What the hazard means relative to possible consequences to health and safety. Build a program with school districts to reach schools and families to build awareness. Work with NWS to promote Winter Awareness Week, including preparation of actual Winter Emergency Kits for distribution through outlets in the community, and of a virtual Winter Emergency Kit found on IDHS or community web site.

#### **4.3.4 Tornadoes and Windstorms**

Because of the capricious nature of tornadoes and windstorms, the most effective mitigation is to help people become prepared and then make the right choices when the disaster hits. This means exploring and identifying



options for individuals and their families. Safe rooms are becoming an important mitigation alternative, either as a specifically built facility or as a designated safe area within a public facility. In addition, through education of the public, the search for “safe rooms” can extend into every home. Mitigating this hazard by the use of warning systems will also help the public prepare for the disaster.



*This photo shows the importance of safe areas and saferooms*

**Project 17: Adopt more strict building codes relating to wind resistant roofs and walls.**

**Lead Agency: IDHS/ Department of Building Services**

**Coordinating Agencies: Local Building Departments, local emergency management**

**Possible Funding Sources:** None required; Legislative Mitigation

**Timeline: Ongoing**

**How Project Contributes to Mitigation Strategy:** Promote public awareness of the need for hurricane straps and foundation tie downs. Work with local emergency management on strategies to reach contractors, displays through retail outlets (hardware stores), etc. Work with legislature to pass the International Building Code (IBC), superceding the present Uniform Building Code. Work with legislators by providing information on the need to adopt the stricter code. Once passed, encourage adoption by communities of the IBC. Where applicable, encourage locals to adopt the IBC. Provide information, and assist in getting local building services inspectors to encourage it, and encourage its incorporation into local land use and development plans.

### **Indiana's Building Codes**

Since 2002, Indiana has operated under the International Building Code for commercial buildings and the International Residential Code (IRC) for

residential buildings. The greatest change in both codes is the significantly strict earthquake requirements, and the establishment of earthquake Design Areas instead of the current Earthquake Zones. In addition, flood plain management is now a requirement under the IBC.

In the code, eight counties (Davies, Gibson, Knox, Posey, Spencer, Sullivan, Vanderburgh, and Warwick) have strict seismic requirements on new construction of 1 and 2 family dwellings that is at least as rigorous as current commercial requirements. The rest of state will still have no seismic requirements for 1 and 2 family dwellings. There are new restrictions on townhouses in the following counties: the eight counties noted above, and Clay, Crawford, Dubois, Greene, Lawrence, Martin, Monroe, Orange, Owen and Perry.

For wind resistance requirements, the IRC will increase from the previous 70/80/110 mph design requirements depending on location in the state to a uniform state requirement of 90 mph for all locations. The snow load requirements will remain the same: 20 lbs. per sq. ft. in the southern and central portions of the state, and 30 lbs. per sq. ft. for the northern 16 counties of DeKalb, Elkhart, Fulton, Jasper, Kosciusko, La Grange, Lake, La Porte, Marshall, Newton, Noble, Porter, Pulaski, St. Joseph, Starke and Steuben.

***Project 18: Update outdoor warning systems.***

***Lead Agency: IDHS***

***Coordinating Agencies: Local emergency management, State/County warning points, NWS, FEMA.***

***Possible Funding Sources: HMGP, Pre-Disaster Mitigation program***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Reduce the number of injuries and loss of life from tornadic winds and severe storms to the persons who are outdoors during severe weather events. The 1950-60's systems are old and worn out, and repair parts are unavailable. There is insufficient coverage, especially for expanded communities. Identify communities that need additional, new systems and those in need of replacements. Upgrade systems replacing with a broad scope warning system that can be remotely activated according to need. Work with communities on a plan to encourage residents to purchase weather radios.

***Project 19:*** Coordinate with local emergency management agencies to pre-designate safe areas for at-risk population.

***Lead Agency:*** Local emergency management

***Coordinating Agencies:*** IDHS

***Possible Funding Sources:*** Pre-Disaster Mitigation program, local sources.

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Work with local emergency management to identify those at-risk populations and designate safe areas. Promote public awareness as to location of these safe areas. Improving the public's awareness of their risk of severe storms and tornadoes throughout the state and the need to take steps to mitigate their exposure.

***Project 20:*** Develop safe rooms in new and existing private residences.

***Lead Agency:*** IDHS

***Coordinating Agencies:*** Local emergency management, local builders' association, FEMA.

***Possible Funding Sources:*** HMGP, Pre-Disaster Mitigation program

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Investigate alternative types of safe rooms for the purpose of retrofitting existing structures. Work with local emergency management to develop a strategy to encourage contractors and new home buyers to build basements or safe rooms within new structures. Work with emergency management and community leaders to explore options for manufactured housing residents, including pre-fabricated modular storm shelters.

***Project 21:*** Develop safe areas in public and private schools.

***Lead Agency:*** IDHS

***Coordinating Agencies:*** Local schools districts, Local emergency management agency.

***Possible Funding Sources:*** HMGP, Pre-Disaster Mitigation program, School District, private sources.

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Reduce the risk to the state's school population from severe storms and tornadoes. Work with public and private school officials and local emergency management to provide technical assistance in the form of engineering expertise to identify areas within existing schools that are survivable in the event of tornadoes. Also, encourage school districts to include safe areas in the design of new schools. Encourage schools to secure private grants and funds for actual design and construction.

#### **4.3.5 Earthquakes**

For earthquakes no warning systems exist, so an important aspect to mitigation is to secure public facilities and infrastructure to withstand the event, and educate the public to prepare in their own homes. Three important goals to protect the community and community services are retrofitting, risk assessment and monitoring, and education of builders and the public.

***Project 22: Perform structural mitigation of critical facilities - fire stations, police stations, hospitals, 911 communications centers, schools, gas, electric, water and waste water facilities. Provide funding to retrofit existing structures and cover the cost difference of building a new facility to exceed state and local building codes.***

***Lead Agency: Local Emergency Management***

***Coordinating Agencies: IDHS, FEMA, County Municipalities***

***Possible Funding Sources: HMGP, IDHS, local community***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Improve the local emergency services ability to respond after an earthquake by "hardening" their facilities. Work with local communities to identify critical or essential facilities in the State's earthquake risk zones. Also, assist in involving local architects and engineers to perform structural analysis of identified structures and make recommendations on the type of structural mitigation to be performed. Assist local emergency management to identify funding sources and contractors to perform the work.

***Project 23:*** Encourage non-structural mitigation of critical facilities, including securing all non-structural elements of a structure, such as furnishings, suspended ceilings and light fixtures, building utilities like water, gas, electric and waste water. Critical facilities include schools, fire stations, police stations, 911 communications centers, hospitals, gas, water, electric and waste water facilities.

***Lead Agency:*** Local Emergency Management

***Coordinating Agencies:*** IDHS, FEMA, Local utilities

***Possible Funding Sources:*** HMGP, IDHS, local community

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Reduce losses to inventory and personnel through non-structural mitigation. Work with local communities and agencies to identify non-structural risks in critical facilities. Assist in prioritizing projects and funding sources. Also, work with local emergency management in formulating a strategy for implementation of the project.

***Project 24:*** Develop an Indiana specific earthquake awareness program. This would include an Indiana earthquake risk video, explaining the seismic risk to Indiana and how to properly prepare and mitigate. Pamphlets and other materials would also be developed. Target audiences include, schools, local government agencies and businesses.

***Lead Agency:*** IDHS

***Coordinating Agencies:*** FEMA, American Red Cross, State Universities, Indiana Geological Survey

***Possible Funding Sources:*** HMGP

***Timeline:*** Ongoing- Video completion May 2005.

**How Project Contributes to Mitigation Strategy:** Improve the awareness of risk from earthquake. Work with American Red Cross, Educational Institutions, and other agencies to develop an aggressive education and public awareness program on earthquakes that is Indiana specific. Identify project and funding sources for implementation and development of a plan for this program.

***Project 25:*** Promote a public education and identification program to award small one-time grants to homeowners to perform structural and non-structural mitigation in their homes.

***Lead Agency:*** Indiana Department of Homeland Security Agency

***Coordinating Agencies:*** FEMA, American Red Cross, Habitat for Humanity, Homeowner Associations

***Possible Funding Sources:*** HMGP, Pre-Disaster Mitigation program

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Reduce earthquake and cascading events to residential structures by encouraging non-structural and structural mitigation. This will also increase public awareness in the earthquake risk in Indiana. Work with local emergency management and Red Cross to promote in-home structural and non-structural mitigation programs in their communities. Identify funding sources and assist in developing programs to facilitate the grant process.

***Project 26:*** Develop a SOP (ATC 20 & ATC 21) to allow engineers, architects, building contractors and building officials to assist locals with damage assessment of damaged structures from earthquakes but also for all hazards.

***Lead Agency:*** Indiana Department of Homeland Security Agency

***Coordinating Agencies:*** FEMA, Trade Groups, State and local building commissions, Purdue University

***Possible Funding Sources:*** HMGP, NETAP, HMTAP

***Timeline:*** Ongoing

**How Project Contributes to Mitigation Strategy:** Improve the data in HAZUS-MH on critical facilities. This will improve the states overall risk and vulnerability assessment for the plan. Provide funding to disseminate this SOP to engineers, architects and building contractors on disaster resistant construction and pre- and post-earthquake building evaluation. Provide opportunities for local officials to attend ATC-21(pre-damage) Rapid Seismic Evaluation of Buildings seminars and other earthquake-resistant programs by hosting the training or providing information on where training is being held. Indiana IDHS, with cooperation from the Purdue University School of Engineering, is currently in the process of creating a cadre of trained engineers that will be available to do ATC 20 (post-damage) evaluations after an emergency event.

***Project 27: Promote Earthquake Risk Mapping***

***Lead Agency: Indiana Geological Survey***

***Coordinating Agencies: IDHS, FEMA, USGS, CUSEC State Geologists***

***Possible Funding Source: HMGP, USGS***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Improve the awareness of the risk and vulnerability to earthquake and identify potential projects to reduce the losses from these events. Provide additional funding to the Indiana Geological Survey to continue their efforts to produce detailed soil studies. These studies will help IDHS in their efforts to keep earthquake data and maps current. This will also aid in IDHS's efforts to aid local communities in assessing their earthquake vulnerability. Participate in HAZUS user's group to provide better data for earthquake maps.

***Project 28: Seismic Monitoring***

***Lead Agency: Indiana University,***

***Coordinating Agencies: IDHS, FEMA, USGS,***

***Possible Funding Sources: HMGP, National Science Foundation and other grant sources***

***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Improve the risk and vulnerability assessment and promote public awareness of earthquake activity in the state. Provide financial assistance to the Indiana University Department of Geological Sciences, to install, expand and maintain a statewide seismic monitoring network and interpret data that is recorded. This will show faulting by recording earthquake activity within the state.

***Project 29: Retrofit of Existing and New Construction of Bridges and Roads.***

***Lead Agency: Indiana Department of Transportation***

***Coordinating Agencies: IDHS, FEMA, USDOT and Federal Highway***

***Possible Funding Sources: HMGP, USDOT***

***Timeline: Ongoing***



**How Project Contributes to Mitigation Strategy:** Reduce losses to critical infrastructure, and ensure the ability of response agencies to provide services after events. Provide funding to the Indiana Department of Transportation (INDOT) for seismically retrofitting existing bridges and roads to cover cost difference in designing and building new bridges and roads to exceed seismic requirements on routes that have been identified as priority routes and access to other critical areas. Work with INDOT to identify high risk counties. Once this is complete it will assist in ensuring that mitigation measures are included in new construction plans and in retrofit projects on existing structures.

***Project 30: Training of State staff in HAZUS. Creation of a State HAZUS user's group.***

***Lead Agency: FEMA, IDHS***  
***Coordinating Agencies: GIS Commission***

***Possible Funding Sources: HMGP, PDM-C,***  
***Timeline: Ongoing***

**How Project Contributes to Mitigation Strategy:** Encourage the improvement of datasets within the state. Use state staff and user groups to showcase the capabilities of HAZUS-MH to assist in risk assessment with refined data and encourage the sharing of these datasets. Mitigation Division staff will complete training for HAZUS MH courses offered in house. Additionally, it encourages all communities to attend HAZUS training. Earthquake program manager will lay groundwork for a statewide HAZUS user's group to assist communities in the collection of data and the use of that data to develop more accurate results from the software. Encourage the use of the program beyond current limitations.

#### **4.4 Implementation and Selection of Projects**

The state evaluated the action items above on the basis of three major criteria: those that are technically and economically feasible, cost beneficial, and environmentally sound. Additionally, by using [mitigationplan.com](http://mitigationplan.com), as local plans are approved, their mitigation projects and action items will be automatically incorporated into the state's plan. The State Administrative Plan includes minimum criteria to be considered for the selection of a project for funding. The mitigation division will use these criteria to determine which projects will be brought to the Indiana State Hazard Mitigation Council for consideration. It will be the decision of the council which projects are forwarded for funding under the HMGP and FMA programs.

The ISHMC will take into consideration the FEMA and federal priorities for funding, the priorities of the legislature and the governor, the community with the



greatest need (either by risk or economic factors) and which project provides the greatest benefit for the funds expended. The factors that will be considered are:

- Community with severest impact
- Repetitive losses in the project
- Small and Impoverished Communities
- Benefit Cost Ratio (FEMA BCA software will be used to make this determination)
- Technically and/or economically feasible
- Environmentally sound

**Cross Reference Of Projects and Strategic Goals**

Project Number	Goals
Project 1	4,7,10,
Project 2	4,7,9,10
Project 3	2,7,9,10,11
Project 4	1,2,7,8,10,11
Project 5	1,2,3,7,9
Project 6	1,2, 6,7,10
Project 7	1,2,3,7,8,9,10,
Project 8	1,2,3,5,9,11
Project 9	12,1,2,3,5
Project 10	12,1,2,3,5
Project 11	1,2,3,4,5
Project 12	1,3,4,11
Project 13	1,3,4,11
Project 14	1,3,4,11
Project 15	1,3,4,11
Project 16	1,3,5,12,
Project 17	1,2,3,4,7,9,11,
Project 18	5,12,1
Project 19	1,3,5,7,8,12,
Project 20	1,4,8,9,10,11
Project 21	1,4,8,9,10,11
Project 22	6,9,10,7,
Project 23	1,2, 3,4,6,9,10,7,
Project 24	1,2,3,7,
Project 25	1,2,3,7,9
Project 26	11,2,3,7,9,10
Project 27	4,7,9,10
Project 28	5,12,4,1
Project 29	6,7,10,11
Project 30	4,9,8,7,10,11

*\* Projects are organized by priority ranking. (First project has the highest priority followed by the next project, and so on.)*

The implementation of the projects is prioritized by hazard. As more local plans are received with projects prioritized, the state will create a more formal prioritization based upon local information. However, the state's priorities are subject to change based upon changing situations within the state and the project prioritization shall be adaptable to those changes.

## **5.0 Local Mitigation Planning Coordination**

The State Mitigation plan in order to give a true picture of what hazards are of the greatest concerns of the residents of the state, the local jurisdiction and the state agencies must include data that can be taken from plans developed on a local level. Therefore, one of the most important elements of this plan is that data. And, although it exists and in some instances is readily available, it is not in a consistent format that can be readily adapted for state use. Data concerning risk and vulnerability assessment is developed or reproduced for no less than three plans just for the purposes of emergency management activities. This duplication of efforts often falls into the capable hands of the local EMA director.

The Mitigation Division and IDHS are committed to developing a means to coordinate local planning efforts. This will not only involve the development of local mitigation plans, but also prevent some of that duplication.

### **5.1 Local Funding and Technical Assistance**

Indiana mitigation division sees its role, and the role of other state agencies as a resource to provide technical assistance to local jurisdiction in the development of their plans. IDHS Mitigation Division and the other state agencies have the technical expertise and data to provide to local jurisdiction to make the mitigation planning process much easier. The Mitigation Division with the assistance of Rose-Hulman engineering students did a vulnerability study of critical facilities in Vigo County. Purdue University Civil Engineering School has been approached to do a similar seismic survey of critical facilities in five southwest counties.

IDHS not only provides technical assistance in the form of planning workshops. The Mitigation Division has also funded HAZUS-MH classes on an ongoing basis to assist in the development of a risk assessment which is so crucial to the mitigation plan. These classes are offered in multiple locations in the state on a regular basis. Additionally, classes in ArcGIS are offered to give locals the basic tool to navigate through GIS applications.

During Federal Fiscal Years 2002-2003, the Mitigation Division received approximately \$600,000 dollars in federal grants from FEMA through the PDM planning grants. With this funding and some existing state funds, IDHS funded 9 county plans, provided HAZUS-MH training, acquired an up to date earthquake risk/soil map for the entire state, and procured an on line mitigation planning tool to assist in the development of local and state mitigation plans. The grant funding will assist in the acquisition and integration of better local and state data for not only HAZUS – MH but also other GIS and data sets.

IDHS, with the Polis Center of Indiana University, applied for and was awarded a grant to fund additional county plans, a state risk assessment and to establish a

network of technical experts. The network would be made up of state agencies and university personnel who would be able to assist local jurisdictions in risk assessment, plan development, project identification and implementation. Once established, this network would be maintained as a source of information and expertise that all local jurisdictions could access to provide necessary technical knowledge or skills as needed for planning purposes.

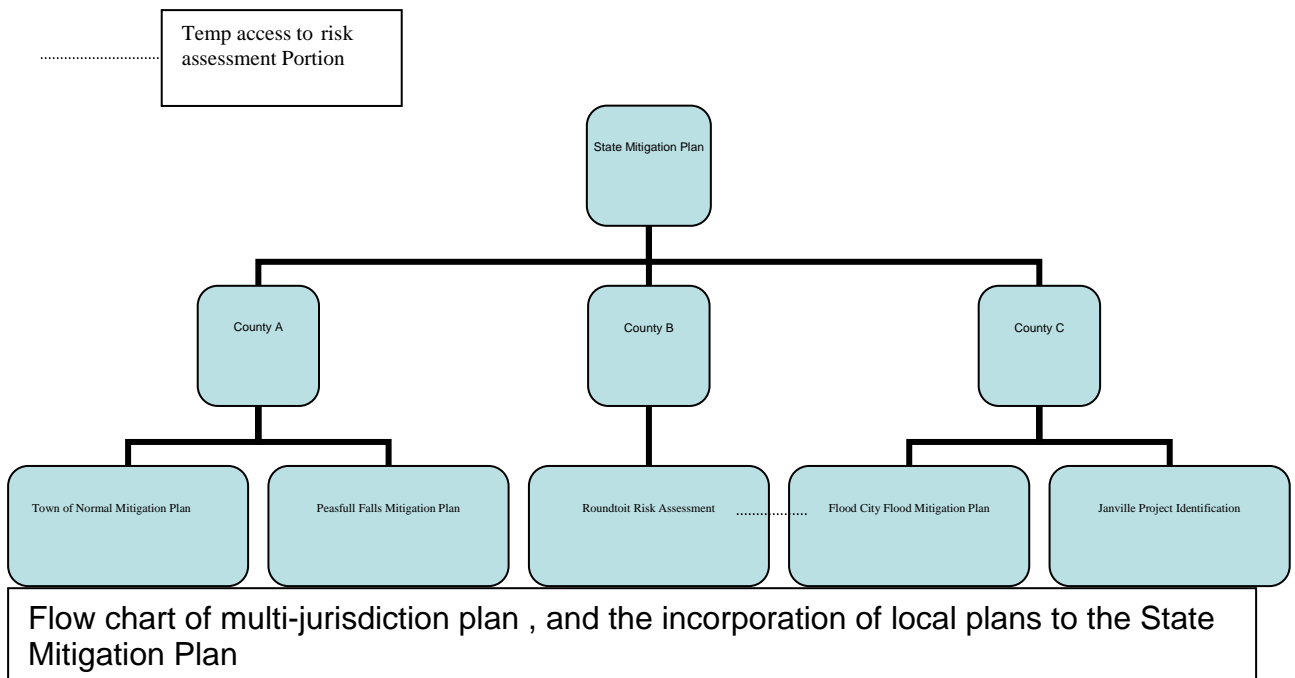
## **5.2 Local Plan Integration**

As discussed in the Risk Assessment portion of this plan the integration of information contained in local mitigation plans is significant importance to the Mitigation Division. However, it is important to receive this information in a timely manner and in a consistent format and one that is adaptable to state use for the purpose of mitigation planning.

As a result of a grant of \$200,000 from Pre-disaster Mitigation planning grant funding and state funding, IDHS Mitigation procured a web-based mitigation system. The system provides guidance to local jurisdictions in the development and writing of a local mitigation plan. The website is [www.mitigationplan.com](http://www.mitigationplan.com). All 92 counties and 3 cities or towns have been assigned Usernames and Passwords. The state can issue passwords to unlimited number of jurisdictions within the state.

The system requires that the locals provide information it requests. It stores the information in a database. It allows locals to control who has access to information, to share information with other jurisdictions on temporary basis, tracks meetings that were held for mitigation planning, allows public access to the information for review (for a set period of time) or to provide input. The State can monitor the development of the plans on a real time basis, make comments, crosswalk the plans and score them and to track overall scores for all users.

The integration of local plan data into the state plan, including risk and vulnerability assessment data, loss estimates, capability assessments, and mitigation actions and projects, will be an ongoing process. The State of Indiana will begin the integration process with the next revision of this document and will continue as new plans are completed.



The County plans are set up as multi-jurisdictional plans which allow the communities with in each county to develop a separate plan or a portion of a plan that can be “rolled up” into a County Plan, whose data can be brought into the State plan. The plans are created when the jurisdiction has filled in the appropriate information. The system will produce a Word document that can then be edited and “polished” by the local community.

Because the data is stored in a database format, the state can readily access the information and will receive it in a standardized format that can be easily brought into the state plan. Additionally, the State can develop its plan on the web site. The Enhanced Plan will be developed on this system to allow comments from locals, other agencies and the public while the plan is being developed.

### **5.2.1 Local Plan Review and Approval Process**

All local mitigation plans are submitted to the IDHS Mitigation Branch. The SHMO will review the draft document and provide feedback to the local communities to ensure compliance with the 44 CFR 201.6 criteria within 45 days of the arrival. The State will submit the Plans to FEMA for final approval. When the State receives notification of the approval from FEMA, the State informs the local jurisdictions in writing of the approval, when the update of the plan should be conducted and the procedures that should be followed during the update process.

The State will utilize the mitigation actions identified within the on-line planning system for each local jurisdiction. When Plans are approved, the actions will be entered into a database. The database provides a list of mitigation actions

identified in each Plan, the hazards each action addresses and the estimated cost of each action. As additional Plans are approved and as updates are reviewed, the SHMO will update the database within 180 days. The State will continue to refer to the database to ensure the State Plan reflects the needs of the locals. When a disaster occurs, the state will use the database to identify potential projects. If a project is not identified in the database it will not be considered for funding unless the risk and vulnerability assessments and the mitigation action sections of the local mitigation plan are revised to support and show the need for the desired mitigation project. Sample of the database is provided as a part of this plan as file name [mitigation projects all.xls](#).

### 5.3 Prioritizing Local Assistance

Outside of the requirements of any grant or funding that IDHS receives for the purpose of local planning, the prioritizing for receiving funding will be decided by the IHMC or if so tasked, the State Hazard Mitigation Officer. In past practices, local need and the availability of funding have been the determining factors in designating a county for funding. Additionally, communities which have been determined to be small and impoverished also receive first consideration.

However, because the need for funding far exceeds the available funding to the state, counties have received on a first come first serve basis. With the adoption of the Disaster Mitigation Act of 2000 and the requirement for planning for mitigation project funding, the emphasis has been placed on counties that were part of the declarations, have projects identified for funding, and have the greatest need for outside funding. In 2003 the state requested funding through the Pre-disaster Mitigation Competitive Grant program. The state received a grant, but the scope was reduced from 16 counties to 5. For PDM-C 2005 the state has encouraged locals to apply for planning grants to hire outside assistance to complete their plans.

The State of Indiana intends on continuing to use the past prioritization scheme for the prioritization of future local assistance. The funding prioritization will be based upon availability of funding, financial status of the community (small and impoverished communities have priority.), and lastly federal mandates.

Community Name	Funded	Status of Plan
City of Elkhart	Yes	In Region for Review
Vanderburgh County	Yes	In Region for Review
Adams County	Yes	In Region for Review
Allen County	Yes	In Region For Review
Wells County	Yes	Under development/First Draft
Madison County	No	Under development
Hamilton County	Yes	Under development/First Draft

Marion County	Yes	Under development
Orange County*	Yes	Under development
Pike County	Yes	Under development
Crawford County	Yes	Under development
Wayne County	Yes	Under development/First Draft
Howard County	Yes	Under development
Montgomery County	Yes	Under development
Brown County	Yes	Under development
Tippecanoe County		Under development
Elkhart County	Yes-Flood only funded	Under development
Dubois County	Yes	Under development
Boone County	No	Under development
Johnson County	No	Under development/prelim draft
Jackson County	No	Under development/planning team
Monroe County	No, requesting funding	Planning team only

\*Only those portions in the NFIP program or no identified flood hazard.

For non-planning grants, acquisitions, retrofits, etc., the prioritization criteria will be as outlined in the State of Indiana Hazard Mitigation Program Administrative Plan as follows:

**MINIMUM PROJECT ELIGIBILITY CRITERIA as outlined in 44CFR;**

To be eligible for the All Mitigation Grant Programs, a project must:

- I. Be in conformance with the Hazard Mitigation Plan developed as a requirement of Section 322;
2. Have a beneficial impact upon the designated disaster area, whether or not located in the designated area;
3. Solve a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed. Projects that merely identify or analyze hazards or problems are not eligible.
4. Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project;
  - a. Addresses a problem that has been repetitive, or a problem that poses a significant risk if left unsolved.
  - b. Will not cost more than the anticipated value of the

reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur. Both costs and benefits will be computed on a net value basis.

- c. Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options.
- d. Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address.
- e. Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

### **ADDITIONAL STATE CRITERIA**

In addition to the above criteria, the state may consider other factors when evaluating potential Section 404 and other mitigation projects. These may include, but are not limited to, the following;

- 1. Geographic dispersion of projects.
- 2. Projected cost of a project.
- 3. A project's contribution to providing protection from flooding, as opposed to other types of disasters.
- 4. Addresses a problem that if left unattended would leave residents in a life threatening situation would lead to undue economic hardship on the community.
- 5. Additional criteria can be set by the SHMO with the approval of the Mitigation Council as funding and program guidelines may dictate.

Currently, the state has prioritized projects by hazard. Additionally, as more local plans are received and approved the state staff will use local priorities to improve the states prioritization of projects. These priorities will change as major disasters and damages occur in the state and these priorities should be adaptable to these factors.



## **6.0 PLAN MAINTENANCE PROCEDURES**

### **6.1 Monitoring, Evaluating, and Updating the Plan**

The Indiana State Hazard Mitigation Officer (SHMO) shall be responsible for the maintenance and implementation of this plan. The SHMO is also responsible for monitoring the funding and implementation of mitigation projects in the state administered by the Indiana Department of Homeland Security.

#### **Monitoring and Evaluating**

The purpose of monitoring the plan when the state experiences events which may lead to declarations is to review and evaluate how well the overall strategies work to achieve the goals of the state's and local's mitigation goals. At the first scheduled meeting of the council after an event, the SHMO and IHMC will monitor the plan with each declared disaster for the continued relevancy of its goals and objectives. (Note: The Director may call a meeting as required, but usually occurs within 30 days of the disaster declaration) They will evaluate whether the designated projects have been effective in reducing losses due to the natural hazards they were designed to mitigate against and if they have reduced losses from other hazards. This will be accomplished by:

1. Identifying mitigation projects within the declared areas
2. Evaluating if mitigation projects designated to mitigate against the hazard, are relevant to declaration. If projects are relevant to the hazard which precipitated the declaration:
  - a. By utilizing information from past declarations, local plan data and anticipated losses based upon HAZUS-MH runs, compare prior damages and losses to post mitigation losses reflected on PA, IA and damage assessment reports.
  - b. Review the goals and projects to determine their relevance to changing situations in the state.
  - c. Review the Risk Assessment as necessary such as upon receipt of new HAZUS-MH modeling, or critical facility information.
  - d. Assess local data from plans through mitigationplan.com as it is incorporated in state's plan (Note: because the state plan is a multi-jurisdictional plan all data updated by the locals is automatically incorporated in to the state's plan on mitigationplan.com)
  - e. Identify implementation problems (technical, political, legal and financial) based upon quarterly progress reports, and input from the local jurisdictions and sub-grantees, and state agencies.

3. Review final quarterly reports to confirm what projects are completed under each goal.
4. Updating the plan to reflect the successes and newly identified the as a result of the monitoring and evaluating.

Several projects in this plan stipulate an “ongoing” timeline. The Indiana Department of Homeland Security will update these projects each year, by altering the objectives, if needed, and reporting on the status.

## Updating and Expansion

When there are no declared disasters, the SHMO will update and expand this plan yearly to include other natural and man-made hazards that threaten the citizens of the State of Indiana, and delete or add mitigation goals, or legislative changes. The existence and evolution of community mitigation plans will be tracked. With the assistance of the planning staff of all the divisions in IDHS, the SHMO will continue to improve and expand the risk and vulnerability assessment on a state and local level. As the counties complete their mitigation plans through the *mitigationplan.com* site, this will better facilitate the incorporation of local objectives into the state plan and assure the continued relevancy of the State’s mitigation goals.

The hazards identified and addressed in the plan will be expanded on the basis of a continuing evaluation of the hazards that consistently cause:

- *Loss of life*
- *Damage and destruction of property*
- *Negative impact on the state’s economic and social structure*
- *Identified as significant by a local entity.*
- *Upon the direction of the IHMC or the Governor.*

Plan section	Review Schedule	Responsibility	Significant event review
Section 1 Prerequisites	Year3	SHMO	No
Section 2 planning Process	Years 1-3	SHMO	No
Section 3 risk assessment*	Year 1-3	ISHMC planning subcommittee	Yes
Section 4 mitigation strategy*	Year 3	ISHMC	Yes
Section 5 local	Years1-3	SHMO	Yes

planning			
Section 6 Plan maintenance	Year 3	SHMO	No

Table 6.1 – Schedule for plan review and monitoring for the State Mitigation Plan

\*These sections are automatically updated by mitigationplan.com as the local plans are updated or upon approval of their plans, and inclusion in the state plan.

## 6.2 Monitoring Progress of Mitigation Activities

The monitoring of projects and the closeout of grant processes are covered at length in the Indiana Administrative Plan. Indiana's Administrative plan is meant to be a multi-grant program administration and grants management document. It is the means by which the IDHS's Mitigation Division operates (Standard Operation Plan). Additionally, all mitigation grants awarded require that the local jurisdictions sign a state and local agreement that outlines the reporting requirements, both fiscal and narrative, of project progress and closeout requirements. It includes maintenance and post closeout requirements for the local jurisdiction.

The state will review the progress of the projects on a quarterly basis. Projects which entail elevation or acquisition will be surveyed at start of construction or demolition and the completion of the project. Currently, every sub-grantee must provide supporting documentation for all transactions at the earliest possible opportunity, but no later than the next quarterly report. This is both during the grant period and post grant (Indiana Mitigation Administrative Plan). The mitigation section, through the cooperation of the local EMA directors, State Field Coordinators, and Department of Natural Resources monitors the status of project areas and programs. The staff of the agencies visits the counties on a regular basis and report the status of project sites and their maintenance.

The Mitigation Division in preparation for developing an Enhanced State Mitigation Plan is acutely aware that there is not sufficient staff in house to monitor all of the projects and programs that are currently under development or will be under implementation before the next planning cycle. The Enhanced Plan will provide a staffing plan which will better align the personnel needs and the project implementation goals. Additionally, as part of the plan, the mitigation division will develop on line reporting forms for sub-grantees which can easily be incorporated in to the federal web based system which will be available with federal fiscal year 2005 Pre-disaster Mitigation Competitive grants.

The state will use the public outreach at the local safety fairs and annual county fairs to evaluate how effective those projects which did not require funding to accomplish, through surveys and anecdotal reports from attendees. Projects, such as winter awareness, storm preparedness, and flood awareness programs are developed by state and local agencies to increase public awareness enhance

public safety and the community's response to these events. They have proven effective, but require little or no public funding.

#### **ONGOING MITIGATION GRANT PROJECTS**

<b>HAZARD MITIGATION GRANT PROGRAM</b>	<b>DATE AWARDED</b>	<b>AMOUNT</b>
Fort Wayne Acquisition Draper	1/23/2004	\$ 122,500
Bluffton	5/3/2004	\$ 684,926
Alexandria Acquisition	1/21/2005	\$ 112,790
Decatur Acquisition	5/3/2004	\$ 749,657
Fort Wayne Acquisition	7/7/2004	\$ 925,451
Kokomo Acquisition	12/22/2004	\$ 430,688
Rennselear	5/21/2004	\$ 584,363
Noblesville		\$ 499,596
Muncie		\$ 162,679
Delaware		\$ 258,411
Tippecanoe		\$ 449,391
Earthquake Video	3/10/2004	\$ 37,500
Tornado Warning Project	6/24/2004	\$ 73,223
Hospital Retrofits	8/11/2004	\$ 26,000
Anderson Elevation	4/7/2004	\$ 7,040
Geological Survey Risk Map	2003	\$ 29,000
Hazus/GIS Classes	EMPG FUNDS	\$ 100,365

#### **FLOOD MITIGATION ASSISTANCE**

Fy 2003 Howard County Acquisition	7/20/2004	\$ 216,987
Fy 2003 Elkhart Planning	7/20/2004	\$ 14,600
Fy 2003 Fort Wayne Acquisition	7/20/2004	\$ 190,875
Fy 2003 Holiday Lakes Acquisition	9/30/2003	\$ 112,125
FY 2004		
Fy 2005 Howard Co. Acquisition		

#### **PRE DISASTER MITIGATION GRANT**

Fy 2003 Planning Grants (7 Counties)	7/30/2003	\$ 248,375
FY 2004 Visual Risk Planning System	6/4/2004	\$ 350,000
FY 2005 Planning Grants		

#### **PRE DISASTER MITIGATION COMPETITIVE GRANT**

Polis Center Risk Analysis/GIS Project	6/14/2004	\$ 500,000
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### Funding Requirements as a Result of Flooding During 2003

COMMUNITY	Congressional District	# of Substantially Damaged Homes	Amount Needed for Substantially Damaged	Number of Homes Already Acquired	Funding Obligated	Available Funding	funded under 1433 & FMA	To be Funded 1487	To be Funded 1520	To be Funded 1542	Funding to be Obligated	Number of Properties Remaining	Cost of Remaining Properties to be Acquired
Bluffton Phase I	6	17	\$ 684,926	17	\$ 684,926							0	\$ -
Renselear	1	8	\$ 584,363	8	\$ 584,363		8					0	\$ -
Decatur	6	47	\$ 5,319,544	14	\$ 749,657							33	\$ 4,569,887
Howard Cnty	5	7	\$ 609,765	2	\$ 216,987		2				\$ 163,300	3	\$ 229,478
Fort Wayne	2	31	\$ 2,410,000	16	\$ 925,451							15	\$ 1,484,549
"Orphan Properties"	various	8	\$ 1,500,000									8	\$ 1,500,000
Kokomo	5	18	\$ 1,152,000	13	\$ 432,000							5	\$ 720,000
Noblesville	5	14	\$ 1,015,375						10		\$ 583,210	4	\$ 432,165
Alexandria	5	7	\$ 755,000	2	\$ 112,790				2			5	\$ 642,210
Tippecanoe Cnty	4	7	\$ 449,391							5	\$ 350,000	2	\$ 99,391
Vera Cruz	6	6	\$ 272,727									6	\$ 272,727
Muncie	6	2											
Delaware	6	3	\$ 279,325					5			\$ 279,325	1	\$ -
New Corydon	6	3	\$ 131,139									3	\$ 131,139
Morgan County	4	3	\$ 433,000									3	\$ 433,000
Warren County		1	\$ 100,000									1	\$ 100,000
FEMA DR-1433													
FEMA DR-1487						\$ 279,325							
FEMA DR-1520						\$ 696,000							
FEMA DR-1542						\$ 350,000							
FEMA DR-1573**													
FMA FFY 2003						\$ 163,300							
FMA FFY 2004						\$ 163,300							
FMA FFY 2005													
TOTAL		182	\$ 15,696,555	72	\$ 3,706,174	\$ 1,651,925	10	5	12	5	\$ 1,375,835	89	\$ 10,614,546
TOTAL NEEDED			\$ 10,338,456										



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